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COMMUNITY GARDENS

A "FOURTH BASKET" IN SINGAPORE'S FOOD STORY?

Policy Report

August 2021

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Executive Summary

This policy report proposes that community gardens have the potential to be a reliable basket that adds to Singapore's food supplies, focusing on leafy vegetables. This is given the availability of usable spaces for growing crops on public and private estates, rooftops, schools, organisations/institutional facilities, interim land, and industrial spaces. However, regulatory requirements for farmers to sell their produce are currently tailored for commercial farm establishments and thus conceivably too complex for individual community farmers. Moreover, productivity levels are low given community gardeners' limited time and investments in growing food. This report highlights how digital technologies can help transform food farming to address community farmers' "pain points", making it a more viable enterprise. It concludes with two recommendations: i) to encourage the formation of organised community clusters to navigate the complex regulatory requirements for selling food, and ii) to conduct digital-readiness assessments on community farmers' attitudes towards digital technology adoption.

Can Community Gardens Serve as the Fourth Basket for Singapore's Food Security?

Singapore's "30 by 30" strategy currently aims to achieve 30 per cent food self-sufficiency in nutritional terms by 2030. Within the Singapore Food Story, three "food baskets" are currently envisioned.[1] In the case of leafy vegetables, imports (the largest basket) contribute 80 thousand tonnes worth SGD 137 million[2] that make up approximately 86 per cent of its vegetable consumption requirements in total tonnage.[3] The next basket--local commercial food production--sees 77 hectares being used for leafy vegetables (including rooftop and indoor farms).[4] The government has been expanding vegetable farming in plots of 1-2 hectares, resulting in 12 new plots in 2017, five in 2018, and one each in 2019 and in 2021.[5] The third basket envisioned, is by growing food overseas and exporting them back to Singapore.

Community gardens have the potential to boost Singapore's food resilience by increasing the amount of local production within unused spaces. On HDB rooftops alone, there are over 661 hectares of space which can potentially be used for food farming.[6] Currently, the initiative involves growing food on public estates (e.g., Jurong Central Zone D), private estates (e.g., Ivory Heights Condominium), schools (managed by environmental clubs), and organisations/institutional facilities (e.g., Khoo Teck Puat Hospital).[7] The National Parks Board (NParks) has also allocated 1,960 gardening plots (2.5m x 1m sized planter beds) under the Allotment Gardening Scheme at over 20 locations all over Singapore.[8] Apart from these, there is further scope to expand the use of unused spaces like interim land and industrial spaces.

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[1] SFA (2021). "Our Singapore Food Story – The 3 Food Baskets", SFA Website. https://www.sfa.gov.sg/food-farming/sgfoodstory

[2] SFA (2021). "Food Imports", SFA Website. https://www.sfa.gov.sg/docs/default-source/tools-and-resources/yearly-statistics/food-imports.pdf.

[3] SFA (2020). *SFA Annual Report 2019/2020*. sfa-ar-2019-2020.pdf

[4] SFA (2021). "Food Farms in Singapore", SFA Website. https://www.sfa.gov.sg/food-farming/food-farms/farming-in-singapore.

[5] SFA (2021). "Land Sales Announcements", SFA Website. https://bit.ly/3jEQwt1

[6] Astee, L.Y., Kishnani, N.T. (2010). Building integrated agriculture utilising rooftops for sustainable food crop cultivation in Singapore. Journal of Green Building 5 (2) : 105-113. ScholarBank@NUS Repository. https://doi.org/10.3992/jgb.5.2.105.

[7] NParks (2021). "What is a Community Garden?", NParks Website, https://www.nparks.gov.sg/gardening/community-gardens/what-is-a-community-garden.

[8] NParks (2021). "Allotment Gardens", NParks Website. https://www.nparks.gov.sg/gardening/allotment-gardens.

However, the contributions of community gardens to national food security have not been substantial in adding to the base level of national vegetable production; in fact, there is no category in the 2019/2020 Singapore Food Agency (SFA) annual report that outlines or measures the contributions of community gardens to food availability in Singapore.[9] Can community gardens offer another reliable "basket" for food security, to complement imports, domestic production, and overseas production? This policy report sets forth to explore the potential challenges faced by farmers; the opportunities for digital technologies to contribute to addressing these challenges; and policy implications moving forward.

[9] SFA (2021). *SFA Annual Report, 2019/2020*. Ibid.

Community Gardens as "Non-Commercial" Sources of Food

Community gardening is currently counted as a "non-commercial" source of food in Singapore.[10] This is unlike the typical commercial farms/brands (e.g., Artisan Green, Comcrop, Just Produce, My Local Greens, Netafarm, OpenandEat, Pasar, P&L, Relish, Simply Finest, Sky Greens, Sustenir, The Little Red Farm, Vegeponics, Yili Farm, YOLO Healthy Food). A look at vegetables sold at NTUC Fairprice, Singapore's largest retailer, shows that locally produced vegetables are from these companies/brands, and not from community gardens.

From a private sector standpoint, it makes sense to procure vegetables from commercial sources, given that they are able to provide stability of supply of products as the farmers grow them as a full-time vocation. In contrast, within community gardens, the profile of farmers is mostly that of farmers who see planting as a hobby, or a form of rest and recreation, and not explicitly as a source of income. Had it been otherwise, these farmers would have added to the vegetables sold in supermarkets.

Considering that Singapore's annual leafy vegetables imports amount to SGD 137 million, as cited earlier, it is not inconceivable for local hobby farmers to want to produce more food. This can potentially help to cut down on their food expenses through local production, or serve as an additional source to complement their family incomes.

[10] Additionally, community gardens also serve a conservation function as many heirloom and indigenous vegetables are grown which are not commercially sold.

Regulatory Complexity for Community Gardeners to Sell Vegetables

One among the potential challenges faced on the ground, which can potentially prevent local community gardeners from seizing a cut of the vegetable import market, are the regulatory requirements for selling food.

In the case of commercial farms, the SFA has published an industry guide focused mainly on how individuals can set up their own commercial farms.[11] These include a long series of steps, which takes up to 12 weeks to accomplish, including coordination with up to 11 government agencies in Singapore, namely, the SFA; Enterprise Singapore; Building Construction Authority (BCA); Inland Revenue Authority of Singapore (IRAS); Land Transport Authority (LTA); National Environmental Agency (NEA); NParks; Public Utilities Board (PUB); Singapore Civil Defence Force (SCDF); Singapore Land Authority (SLA); and the Urban Redevelopment Authority (URA).

In addition to these, the SFA also has a certification scheme on Good Agricultural Practice for Vegetable Farming (GAP-VF).[12] There are currently four certified farms: Koh Fah Technology Farm Pte Ltd (ST 8, ST 18, ST 23, ST 75); Meihwa Engineering Pte Ltd (ST 26); Sky Greens Pte Ltd (LCK 214); and Yili Vegetation & Trading Pte Ltd (LCK 82).

Given the nature of policies today, community gardeners who seek to sell their produce will need to go through the process of receiving the license as well as certification, just like commercial farmers. This process may be too complex for hobby farmers within community gardens as they do not ordinarily have the same organisational capacity as commercial farms to comply with such requirements. The solution to this, is not so much in removing such approvals, as it is in creating a body that will help streamline this process for such farmers.

[11] SFA (2020). *Starting a farm: An industry guide*. https://www.sfa.gov.sg/docs/default-source/food-farming/sfa-farming-guide_fa-spread-high-res.pdf.

[12] SFA (2021). "Good Agricultural Practice for Vegetable Farming (GAP-VF)", SFA Website. https://www.sfa.gov.sg/food-farming/farming-initiatives.

Low Productivity Levels and Community Gardeners' Pain Points

A further challenge is the likelihood of low levels of productivity within non-commercial community gardens.

It is understandable that given their limited time and investments, hobby farmers will not be as productive as commercial farmers. This has to do partly with the difference in level of expertise that community gardeners possess relative to commercial farmers. There is also a difference in the ability to comply with food safety requirements, and in managing pests and diseases. Therefore, a key aspect of addressing the productivity gap is to help improve the technical capacity of these farmers through education and training on good agricultural practices and food safety management practices.

The other aspect, however, is behavioural in nature, and relates to the incentives that community gardeners have to engage in intensive food production. Boosting productivity requires consistent time and effort in watering, monitoring, and tending to the crops, which is needed for a successful cropping season--time which hobby farmers may not have in convenience. The failure to sell their products also prevents farmers from acquiring marketing information, including the choice of crops, the manner and timing of planting and harvesting, and the optimal way of pricing their crops.

Furthermore, the low productivity levels among community farmers are not unrelated to the regulatory challenges in selling their produce, highlighted previously. If community gardeners cannot market their products, given their lack of organisational capacity to comply with the requirements, then there is also no incentive to boost their productivity levels. There is thus a chicken-and-egg problem of low productivity levels reducing the investments of time and resources by community farmers in growing food, and in turn, low productivity levels occurring as a result of these low time investments.

Potential for Digital Technologies to Address Pain Points

One way forward is to explore the potential of digital technologies to alter the calculus behind decisions made by smallholder farmers. Some examples are provided below.

Digital Farmer Advisory Services for Enhancing the Community's Farming Knowledge

An example of this is the International Rice Research Institute's (IRRI) Rice Crop Manager application,[13] which provides farmers with an avenue to report their crop performance (including the inputs used and the resulting yields at harvest). This allows the farming community as a whole to grow in its knowledge on rice farming, based on the experience of farmers on the ground, while also tapping on the expertise of crop scientists in the process. It thus helps farmers to maximise their productivity and minimise pest and disease impacts. In essence, digital technologies are not just for commercial farmers, they can also be used by community gardeners to grow more and better.

Hassle-Free Automated Irrigation to Increase Water Use Efficiency

Employing adaptive/automated irrigation (e.g., Jain Systems) provides the opportunity to make urban farming less tedious, since farmers can simply set the rate of irrigation (and timing), rather than having to make daily trips at different times in the day. This increases water-use efficiency by reducing both the water cost per kilogram of output (minimising evaporation, and minimising over-watering which are potential grounds for weeds, pests, and diseases), and can be integrated with automatic fertiliser application within irrigation as well ("fertigation"). This therefore saves time and effort requirement on the part of farmers, while boosting productivity.[14]

[13] IRRI (2021). "Rice Crop Manager". IRRI Website. https://www.irri.org/crop-manager

[14] Jain (2018). "Jain Irrigation, Inc. Acquires Smart Irrigation Pioneer ETwater." Jain Website. http://www.jains.com/Company/news/JainIrrigationIncAcquiresSmartIrrigationPioneerETwater.htm

Reducing the Effort to Monitor Crops and Increasing Alertness to Pests and Diseases

Drones and satellite imagery have the potential to provide more accurate and consistent monitoring of pests and diseases, and contribute as well to crop diagnosis in maximising the productivity of farming and minimising losses.[15] But the use of these will require community gardens to be organised in ways that allow some form of homogeneity in practice.

Digital Labelling for Food Safety

A further potential lies in digital labelling, so that only the certified farmers are able to sell food to markets, and farmers can receive tailored food labels based on their own products' barcodes through their smart phones.[16] This provides "real-time monitoring of food quality to help reduce waste and alert consumers of spoiled food".[17]

E-Commerce for the Marketing of Products and Identification of Crops to Grow

Finally, organised urban farmers can engage consumers in Singapore better through e-commerce applications that help them market directly to consumers (including social media applications like Facebook). Based on market demand data drawn from aggregated e-commerce applications, along with support/advice from the private sector, farmers can better identify which crops to grow and how to price their products as well.[18]

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[15] Sylvester, G. (Ed.). (2018). *E-agriculture in action: Drones for agriculture*. Food and Agriculture Organization of the United Nations / International Telecommunication Union. https://bit.ly/3rRRmGh

[16] Fuchs, K., Barattin, T., Haldimann, M., & Ilic, A. (2019). *Towards tailoring digital food labels: Insights of a smart-RCT on user-specific interpretation of food composition data.* https://bit.ly/3xqaaO9

[17] Morrison, O. (2020). "The digital labelling technology promising to 'unlock the lost shelflife of food'." Food Navigator, 3 December. https://bit.ly/2UWvtcR

[18] Pinduoduo (2019). "Pinduoduo's AI-driven Duo Duo Farm empowers farmers, helping to alleviate poverty in rural areas." Pinduoduo Website. https://investor.pinduoduo.com/corporate-blog/pinduoduos-ai-driven-duo-duo-farm-empowers-farmers-helping.

While digital technologies offer potential to address community gardeners' pain points, the problem is that studies on the relevance of digital technologies have mostly been focused on commercial farming.[19] While some studies have looked at community gardening and considered the potential for commercial sales, they have only looked at basic farming practices, without the lenses of digital agriculture.[20]

[19] OECD (2019). *Digital opportunities for better agricultural practices.* https://www.oecd-ilibrary.org/agriculture-and-food/digital-opportunities-for-better-agricultural-policies_571a0812-en.

[20] Van Veenhuizen, R. (Ed.). (2014). *Cities farming for the future: Urban agriculture for green and productive cities*. IDRC. https://www.idrc.ca/en/book/cities-farming-future-urban-agriculture-green-and-productive-cities.

Conclusion and Policy Recommendations

Many community gardeners do not farm for profit but do so rather as a lifestyle activity. Nonetheless, given the extensive presence of unused space (within public and private estates, schools, and organisations, as well as in interim land and industrial spaces), not to mention the initiative's income generation potential, this policy report proposes to explore uplifting the role of community gardens towards becoming a contributor to Singapore's vegetable supply. For this to happen, however, a mindset change has to occur on the part of regulators, the private sector, and the gardeners themselves.

Given the challenges and opportunities highlighted above, below are two policy recommendations to potentially allow community gardens to contribute to Singapore's food security, as a "fourth basket", in the Singapore Food Story.

1) Encourage Formation of Organised Community Clusters to Navigate the Complex Regulatory Requirements

The first recommendation is to encourage communities to band together to form a corporate/cooperative entity, where individual members help share the time and resources required for registering their farms and receiving the licenses to sell their products.

This is not completely novel, as there are ad hoc approaches that are already in play. The first is the Open Farm Community (OFC), a restaurant that taps on community produce, combined with commercially sourced products from related companies within the Spa Esprit group of companies (e.g., private companies Forty Hands Coffee, Drunken Farmer for wines, and the Butcher's Wife restaurant).[21] Edible Garden City (EGC) likewise provides space for farmers to grow their food, and helps market them, to supply food to over 220 dining establishments across Singapore.[22] Based on these two models, it is not inconceivable for local communities to also start their own initiatives, pooling their resources to address the regulatory requirements in order to get their products on the market.

[21] Open Farm Community (2021). "Growing relationship with food", Open Farm Community Website, https://www.openfarmcommunity.com/about.
[22] Edible Garden City (2021). "What we do: Grow". Edible Garden City Website, https://www.ediblegardencity.com/grow.

This initiative supplements the ongoing initiatives/training by the SFA and NParks in promoting community food farming, and can be explored by a special office/ inter-ministry committee involving the 11 agencies highlighted earlier, under SFA/NParks, partnering with academia, while tapping on Neighbourhood Committees and Residents' Committees to bring this down to the grassroots level.

2) Explore "Plug-And-Play" Community Gardens from "Farm to Fork"

The second recommendation is to explore the potential of digital technologies cited earlier, in making the farming process as manageable and hassle-free as possible. They should address the pain points community gardeners potentially face, as highlighted above, making community food farming as easy as plug-and-play. This exploration may be in the form of a digital-readiness assessment.

The assessment should include a survey of community gardeners' attitudes towards digital technology adoption (especially among older groups); this can include a sample of the 40,000 gardening enthusiasts as part of NParks' Community in Bloom initiative, which is spread across 1,600 community gardens.[23] This should be matched by a survey focusing on the openness of the private sector to cater to community gardeners, and the extent of private sector capacity within Singapore given that agriculture is still in its nascent stages within the city-state. This can potentially build on existing initiatives like A*STAR's Agritech & Aquaculture Horizontal Technology Programme, to help feed into R&D roadmaps targeting agritech and aquaculture technologies, with an explicit focus on boosting digital technology utilisation in food farming among community gardeners.[24]

[23] NParks (2021). "Community in Bloom Initiatives". NParks Website. https://bit.ly/3fVXhFK
[24] ASTAR (2021). "Agritech and Aquaculture". AStar Website. https://bit.ly/2VyEY28

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