

BUILDING SUSTAINABLE URBAN FARMS WITH GOVERNMENT SUPPORT IN SINGAPORE

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Edible Garden City manages a farm on the rooftop of Raffles City shopping mall. Harvests from here supplement the produce grown for restaurants at Citizen Farm - ©Edible Garden City

After a career in online marketing in London, Bjorn Low spent three years travelling and working on organic farms across Europe. He then decided to complement his initial training in business administration (MBA) and obtained a diploma in Biodynamic Agriculture in Great Britain. He returned to Singapore with the ambition of combining his knowledge of farming and his business skills: in 2012, Edible Garden City was started with the hopes of building urban farms to help Singapore tackle its food security challenges.

Launched in 2012, Edible Garden City is specialised in building urban gardens with the ultimate objective of increasing Singapore's resilience and people's connection to food within the city. It operates in the very particular environment of Singapore, a hyper-urbanised city where 90% of food is still imported. To implement a viable and sustainable urban farming model, Edible Garden City has chosen to develop different activities seeking to combine commercial activities with socially driven projects. From consultancy to community farming, Edible Garden City has built 200 edible gardens and can potentially produce a total of 150 kg of leafy greens and 150 kg of mushrooms per month through its "Citizen Farm". The project benefited from the support of the local government through a public-private partnership which has been key to allowing unused spaces to serve for community and commercial agricultural purposes and to reforming regulations to be more accepting of urban farming. This collaboration between local authorities and the privately managed urban farming company demonstrates the importance of cooperation among public and private actors to foster the development of farming initiatives at the city level.

INTRODUCTION

Singapore is a highly urbanised city-state constrained within a small island which is home to 5.5 million people with fairly high purchasing power. Agricultural lands account for less than 1% of its total land area.¹ It may therefore seem natural that 90% of its food is imported² and that Singaporeans are not naturally driven to work in agriculture or to reflect upon food's origins and how it is grown. This appears as a pressing issue, considering that global food demand is expected to increase by 70% by 2050, whilst climate change threatens worldwide agricultural production. Ensuring its population is well nourished by a food production model that respects the environment and promotes social cohesion is a key challenge for the city of Singapore.

Edible Garden City, an organisation specialised in building urban gardens, has sought to increase Singapore's resilience and people's connection to food since 2012. Its activity has recently expanded through Citizen Farm, a sustainable and socially driven community farm which commercialises its products and provides training and educational content. To develop a sustainable and viable business model, Edible Garden City received support early on from local authorities through a public-private taskforce which helped them overcome the challenges to urban farming in Singapore, such as the incompatibility of land use legislation with urban farming initiatives.

1 Ichioka, S. M. "Food Security and Community Bonding in a Globalised City-State: The Case for Urban Farming in Singapore". National Parks Board.

2 Kwek, A. "How Citizen Farm's Sustainable Urban Farming System Offers Ultra-Fresh Ingredients to Singaporeans". 2018.

THE EDIBLE GARDEN CITY PROJECT

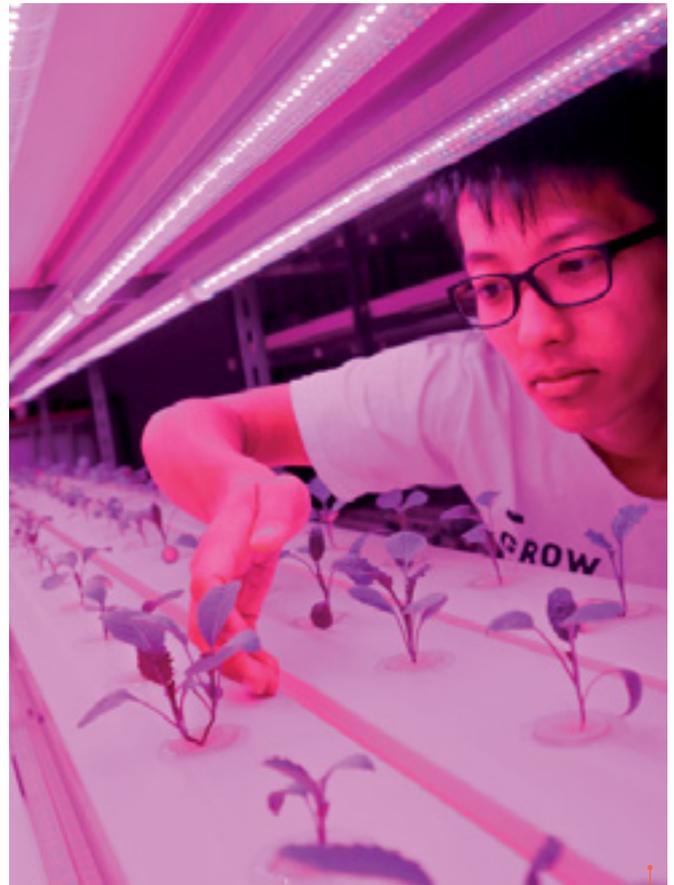
A HOLISTIC APPROACH RELYING ON MULTIPLE INTEGRATED BUSINESS MODELS

Edible Garden City is a ground-up movement that started seven years ago as a way of introducing urban farming to the people of Singapore for residential, educational and recreational purposes. After building small-scale gardens for restaurants for three years, Edible Garden City's vision has evolved over the years with the ambition of giving "every city a farm, every home a garden, and every family a farmer".

Edible Garden City aims at shifting the focus away from trade onto consumers, rebuilding their connection to food and including them in food production. To further these goals, Edible Garden City's activity has diversified into three main ventures with the objective of combining economic viability with social impact. These perpetrate contrasting business models, which are intrinsically and ultimately interlinked as well as constitutive of Edible Garden City's holistic approach to urban farming.

The first and older line of activity of Edible Garden City is the urban garden consultancy, through which the firm builds and grows gardens on city buildings for property developers and restaurants, schools, malls, offices and private residences. Tailored to the customer's needs and goals, the consultancy consists of building a holistic plan to design, build, maintain and manage the urban farm, besides providing the necessary support and tools for its financial viability. Edible Garden City also provides training for customers (i.e. isolating the rooftop, composting), so that they can graduate from external aid and become independent in managing their own garden – an essential aspect in a sustainable model of urban farming. The second line of activity involves operating Edible Garden City's own urban farm, called Citizen Farm. It operates as a classic farm – albeit in an urban setting – by growing, packing and selling products directly to the market at a competitive price. Its customers are mainly composed of restaurants and people from the community, who place orders online and can either have it delivered to their home or establishment or pick it up from the farm themselves. The workforce of the farm is constituted of around 40 employees, who range from 22- to 65-years-old with a 70-30% share of women to men. Trained through an apprenticeship before being offered a full-time position, the farmers come from a diversity of backgrounds. Finally, Edible Garden City provides educational workshops and farm tours by engaging closely with schools, corporations and other communities interested in strengthening their internal sustainability. Citizen Farm and other gardens built by Edible Garden City operate as classrooms in which participants are taught agricultural content and curriculum in order to enable them to grow vegetables in their own spaces and to raise awareness about urban farming.

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Leafy greens are grown on the farm in decommissioned shipping containers, using an indoor hydroponics set up ©Edible Garden City

In addition to these activities, Edible Garden City also exercises a range of social activities. It has collaborated with civil society organisations such as the Autism Resource Centre, Employment for People with Intellectual Disabilities and the Singapore Prison Service to teach farming skills to people with autism and mental disabilities and to inmates. Edible Garden City has helped build a sensory garden for hearing-impaired children and a 150-square-foot garden for the Pathlight school for autism. It also helps the schools design their farming curriculum and teach it to students. The Citizen Farm team is itself composed of some individuals with special needs and from disadvantaged backgrounds, furthering the farm's social role.

Beyond a simple food supplier, Edible Garden City is looking to have a bigger impact on the community through both its commercial activities and its social engagements, which form its social enterprise model of urban agriculture.

EDIBLE GARDEN CITY'S MAIN RESULTS TO DATE

Since its creation, Edible Garden City has built more than 200 edible gardens, which vary across a range of sizes – from smaller (e.g. 1x2 or 1x3-square-metre urban gardens in small homes)



At full capacity, Edible Garden City's Citizen Farm urban farming project can produce 150kg of vegetables and 150kg of mushrooms - ©Edible Garden City

to bigger ones (e.g. a 10x10-square-metre rooftop garden). For instance, the Open Farm Community restaurant has transformed a former golf course into a 10,000-square-foot permaculture community garden which grows 50 varieties of vegetables and herbs, tropical fruit trees, and chickens used in the restaurant's high-quality, organic dishes. Another example is the OUE Downtown commercial building, whose rooftop is covered by a 5,000-square-foot garden which supplies herbs, flowers and salad leaves to the building's restaurants.

Citizen Farm itself grows up to 20 varieties of leafy salad greens such as lettuce, kale and spinach; herbs and microgreens such as basil, mint, lemongrass and coriander; and edible flowers and mushrooms. At full capacity, it can produce a total of 150 kg of leafy greens and 150 kg of mushrooms a month. These products are used in 50 businesses across the island, including world-renowned Michelin-star restaurants, luxury hotels, supermarkets and cosmetics producers. Despite the lack of external funding or high price premiums on their products, Citizen Farm has been profitable – albeit marginally. Citizen Farm has developed the “Citizen Box”, in which a range of fresh products is supplied weekly to about 50 subscriber families.

The grounds of Citizen Farm are also home to Singapore's first insect farm, run separately by Insectta. Insectta currently uses food waste from the food manufacturing process (i.e. spent grains, okara and other items) to feed black soldier fly larvae. The larvae are sold as a livestock feed to local fish farms and pet owners. A natural fertiliser

from the grass is generated for agricultural use as well. This method recycles food waste – a negative-value product – into useful positive-value products that give back to the economy. At a third of full capacity, Insectta recycles over 6 tons of food waste a month.

The farm also employs a combination of hydroponics, an indoor substrate-based system, and outdoor soil-based farming, and it is exploring using organic waste to grow mushrooms. The combination of these different techniques makes it possible to use considerably fewer resources than traditional farming.

A PUBLIC-PRIVATE PARTNERSHIP TO CONVERT UNDERUSED, MARGINAL LAND FOR URBAN FARMING

EARLY CHALLENGES FOR PIONEERING URBAN FARMING IN SINGAPORE

When Edible Garden City emerged, the initiative was confronted with a series of obstacles, intrinsic to its forerunner status. First, there was a considerable lack of space for farming in a densely inhabited city like Singapore. Land scarcity was exacerbated by a complex and restrictive regulatory legislative framework related to land use, since land dedicated to farming was extremely limited and no land allowed farming for social purposes, while land set aside for community purposes did not permit farming.



One of the two varieties of mushrooms grown by Edible Garden City, the pink oyster mushrooms have a bright pink colour and strong umami flavour, making them a favourite among chefs and home cooks - ©Edible Garden City

Regulations had not followed the evolution of technology which enabled mobile farming systems that can be easily adapted to various spaces, in opposition to the constraining operationalisation of sizeable traditional farms.

Second, Edible Garden City faced the difficulty of understanding the structure of local authorities to find the right city representative. Government agents were dispersed across numerous levels, departments and agencies. Developing Edible Garden City was also about dealing with a new, ill-defined concept of urban farming, as well as an unconventional proposal of designing, building and operating gardens on diverse city spaces, which had never been done before in Singapore.

CREATION OF A DEDICATED PUBLIC-PRIVATE PARTNERSHIP TASKFORCE

Recognising the needs of Edible Garden City and the potential benefits of urban agriculture, Singapore's Ministry of National Development led to the birth of an interagency Urban Farming Taskforce with responsibility for analysing the potential impact of technological innovation on domestic food production. The taskforce and Edible Garden City worked as a public-private partnership to develop the Citizen Farm project, navigate

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complex land use regulations, identify the obstructing factors to the development of gardens in the city, and develop solutions to such. It also played a key role in persuading government agencies such as the Singapore Land Authority to allow unused spaces to serve for community and commercial farming and to reform regulations to be generally more accepting of urban farming. Coordinating internal communication among the authorities on the matter

allowed Edible City Garden to establish effective dialogue with local government. Cooperation between Edible City Garden and government actors was necessary for them to work separately from there.

ACHIEVEMENTS

The outcomes of this public-private cooperation have been extremely fruitful. Edible City Garden was able to find the right disused terrain for its Citizen Farm on the 8,000-square-metres of land which used to house the Queenstown Remand prison, demolished in 2010. Citizen Farm was launched in June 2017 and has become a central piece of Edible Garden City's project.

Since then, the Singapore government has also announced the "30 by 30" project, which aims at bringing local food production up to 30% (from the current 10%) by 2030.

The government saw great value in the community creation and social bonding that emerged from the experience. It also allowed startups to test agrotechnology innovations, contributing to Singapore's technological capacity and economic productivity. The normative impact of the initiative was also significant, as even the Foreign Minister of India visited Citizen Farm. Singapore is now globally recognised as a regional leader and knowledge hub for urban farming. In addition, environmental sustainability has been strengthened through the concept of circular economic models for agriculture, and local food security has been enhanced as urban farms supplement food production and decrease external dependence.

Admittedly, urban farming by itself cannot supply all the food consumed by urban dwellers, but it can nevertheless complement imports, especially those of products that can be harvested and grown again, such as vegetables, fish and eggs.

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THE NEXT CHALLENGES FOR SCALING UP URBAN FARMING INITIATIVES AT DIFFERENT LEVELS

To scale up urban farming, there are still challenges at different levels – global, national and at the scale of Edible Garden City.

AT THE GLOBAL LEVEL

- **Improving the definitions of urban farming itself:** at the global level, the main challenge for urban farming involves the need to enhance the existing definitions in the field, which relies mainly on the private sector. There must be more dialogue between private sector initiatives across the world to establish precise and rigorous categorisations of urban farms, peri-urban farms and rural farms. Such a development would help urban agriculture initiatives gain in organisation, visibility, legitimacy and understanding, which is needed to bring about support for their scaling and expansion. Only a common, precise definition and categorisation of different types of agriculture would allow the identification of problems and who does what best.
- **Building human capacity:** despite the recent growth in interest in farming, a lasting reality is the lack of experience and training in the sector as a result of farm employees being brought up as urban dwellers. Urban farms are obliged to hire untrained professionals from backgrounds other than agriculture and train them for a long period of time before they can be regarded as fully operational. As such, urban farms need to *build* human capability, rather than simply *acquiring* it. The general lack of manpower resources for the agriculture industry is a worldwide challenge, which requires more

partnerships between the private sector and academia for higher studies to include farming as an option for students interested in the agricultural sector.

- **Support from decision-makers:** the case of Singapore illustrates how urban farming requires not only openness but also active support from local governments, as they determine the allocation of land and its usage. The structure of government, with its numerous points of access and stakeholders who do not always communicate with each other, can be a real barrier to developing urban agriculture, since it requires convincing numerous actors at different public sector levels, departments and agencies. Public-private partnerships are one of the many ways through which local authorities can support urban farming on rooftops, footpaths and vacant lots.

AT THE NATIONAL LEVEL

- **Increase awareness:** Singaporeans still lack widespread, deep awareness of acting upon more sustainable consumption patterns, which hinders the development of demand among the 5.5 million inhabitants with high consumption power. As a result of the limited spread of responsible consumption among the Singaporean population, urban farms need to spend money on marketing to 98% of the population. The situation is not the same worldwide. The European ecosystem is already mature, as illustrated by the conscience and initiatives against waste, the “buy local” movement and healthy diets. Singapore, notwithstanding its developed-country status, still has some way to go before reaching that sustainability stage.

AT THE PROJECT LEVEL

- **Adapting the right technology to the right project:** recent technological advances have made it possible to design layered indoor farms under controlled conditions, sometimes without the need for soil. They have also enabled farmers to get four to five times higher yields for the same space in comparison to traditional farming. Nevertheless, there needs to be the right fit with the right technology. Edible Garden City depicts a so-called “technology agnosticism” in that, rather than attempting to create a new kind of technology or supporting/depending on one particular kind of technology, its approach relies on employing different kinds of technology (e.g. aquaponics and hydroponics) and levels (i.e. no tech, low-, medium-, high-tech), which vary according to the needs of each situation and the objectives of each customer. Different technologies are continuously tested to observe their viability, advantages and drawbacks in different settings.
- **Understanding real impacts:** convincing the population and key stakeholders such as policymakers directly depends on urban farms' ability to demonstrate and



Gardening workshop at the Citizen Farm - ©Edible Garden City

understand their real impact. At Edible Garden City, more services such as data tracking, social and environmental impact measurements, and statistical infrastructure are to be incorporated this year through a specialised team, in order to measure activities not only internally but also with the community, and to convert the stories and testimonials they have achieved into concrete, measurable numbers and metrics. This is a crucial step for enabling Edible Garden City to understand its own impact on the community, the kind of social value it creates and its positioning among other societal initiatives, as well as to identify drawbacks and room for improvements. Building strong evaluation methods contributes to professional growth and to the ability to draw support from the broader population and attract potential partners.

CONCLUSION

Edible Garden City is today a successful social enterprise launched in the context of the hyper-urbanised and densely built-up cityscape of Singapore, where agriculture has never been a key economic activity or particularly present in people's minds or sustainability demands. The initiative relies on a holistic approach that combines different models to pursue its long-term vision of sustainability: commercial activities, community farming, educational content and societal engagements.

The support of local government through the creation of a public-private partnership taskforce helped communication with the multiple public actors and agencies, and made it possible to identify the main challenges to urban farming initiatives, notably the complexity of the regulatory framework for land use. The city of Singapore has affirmed itself as an early model of acceptance of and support for urban agriculture which has been widely regarded and reported. The city-state today stands out as a leader in urban food production and technology, ultimately contributing to resilience and food security while reconstructing the link between customers and food.

Important steps remain for scaling up urban farms at different levels. At the global level, the private sector needs to agree on definitions of urban agriculture and its different categories, and agricultural training should be provided like any other option in higher studies curricula. At the national level, governments and private enterprises need to reinforce efforts in raising awareness among customers. At the project level, urban farms must develop social and environmental impact metrics in order to attract cross-sectoral support, as well as to find and optimise their positioning among wider society. These are key challenges to enable Edible Garden City to expand to other global metropolitan hubs and to turn Singapore into a real "edible garden city".