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Abstract

The COVID-19 pandemic has caused an increase in the number of poor people around the world and led to the risk of food insecurity on a global scale. Even in Thailand, a country where food production exceeds domestic demand, the COVID-19 pandemic affects food security. The increased unemployment and the consequent loss of income resulting from the pandemics undermine food accessibility and affordability for many people. This chapter addresses the problem of food insecurity in Thailand during and after the COVID-19 crisis. It provides an analysis of the current status of food insecurity and food system resilience in Thailand and suggests solutions. It also proposes the adoption of a “Food Self-Sustained Community (FSSC)” model, which refers to the concept of building food security in a community. By planning and designing in advance, a community can switch its normal form of production seamlessly to a self-sufficiency model that prepares it for future crises, so that the community can produce enough food for all members without relying on sources outside the community.

Keywords: Food self-sustained communities, food security, food system resilience, crisis, COVID-19

1. Introduction

The spread of COVID-19 has severely affected the well-being of many people. It is not only the health effects but also the containment measures related to the pandemic that affects the economy. FAO estimated that 720–811 million people suffered from famine worldwide in 2020, a 9.9% increase from the previous year [1]. Even in Thailand, which can produce more food than its domestic demand, and by 2020 was the 13th largest food exporter in the world [2], in the face of the COVID-19 pandemic, it was reported that people consume less food or face starvation [3] disclosing a concern about access that surpasses availability.

In every crisis, food security awareness is raised and suggestions are made on how to solve the problems and develop food systems to ensure survival for countries’ populations. Many different proposals for food security have been advocated, ranging from global, country, community, household, to individual levels [4–8]. There are seemingly opposite methods, such as market dependence or self-sufficiency [9], protection of domestic markets, and the liberalization of food trade [10, 11]. Players in the food
Food Systems Resilience

system may be centralized or decentralized, and large or small entities [12, 13]. Food production knowledge and technology may be modern or indigenous [14, 15].

The objective of this chapter is to review and analyze the impact of the COVID-19 pandemic on food security in Thailand and review and analyze food system resilience and the challenges of building such resilience in a Thai context. Then, the Food Self-Sustained Community (FSSC) model will be discussed as an innovative approach to create community food system resilience and make communities competitive in normal times and self-reliant in food in times of crisis.

2. Analytical framework

The conceptual framework developed for considering the impact of the COVID-19 crisis on food security in Thailand will be based on the relationship between food systems and food security. Food systems have the following elements and activities throughout the food supply chain:

- factors of food production (the supply of agrochemicals, such as fertilizers and pesticides, as well as animal feeds, water, and agricultural credit)
- food production (the methods by which agricultural products are produced, namely arable farming, horticulture, animal husbandry, fishery, and forestry),
- food processing (the conversion of agricultural products into consumable food, such as food manufacturing, food preparation, and food preservation),
- food stock, food markets, and trade (such as food distribution channels, food marketing and sales, food exports and imports, and food aid),
- and food consumption (including consumption behavior, demand, and purchasing power).

These elements and activities are linked by food transportation, logistics, and finance [6, 16–18]. The four pillars of food security are food availability, food access, food utilization, and food stability [19].

Based on literature reviews [19–22], this conceptual framework assumes that the elements and activities of food systems and food security are related as follows (Table 1)—factors of food production, food production, food processing, and food stock are related to food availability and stability, as they are related to the supply of food products. Food consumption is related to food utilization. Food stocks, markets, trade, logistics, and finance are correlated with food availability, access, and stability because they are activities that relate to food distribution. In addition, the four pillars of food security are also interrelated, for example, food production and food stock affect food availability and food price stability, which affects food accessibility.

For the analysis of the impact of COVID-19 on the Thailand food system, the shocks on the food system are divided into four components—health crisis (the situation due to the outbreak), containment measures (pandemic control measures such as lockdown and the closing of borders), economic crisis (economic depression due to the effects of the outbreak and the containment measures), and the international situation and the response of foreign countries (Figure 1).
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DOI: http://dx.doi.org/10.5772/intechopen.104425

An analysis of food system resilience will also follow the elements and activities of food systems, classified into three periods—pre-crisis, during the crisis, and post-crisis. The term “crisis” means situations where the food system malfunctions and poses a risk of food insecurity due to COVID-19 outbreaks and the responses from governments and other sectors. The pre-crisis food system resilience consists of the ability to prevent crises (prevention), preparedness to deal with the crises (preparation), and the pre-warning system. Food system resilience during a crisis consists of protection from the impact of the crisis (protection), mitigating the effects of the crisis (mitigation), adaptation to cope with the crisis (adaptation), and recovery.

Table 1.
Relationship between the food system and food security.

<table>
<thead>
<tr>
<th>Food System</th>
<th>Food Security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td>Access</td>
</tr>
<tr>
<td>Factors of production</td>
<td>X</td>
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<tr>
<td>Production and Process</td>
<td>X</td>
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<tr>
<td>Stock</td>
<td>X</td>
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<tr>
<td>Market and Trade</td>
<td>X</td>
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<tr>
<td>Consumption</td>
<td>X</td>
</tr>
<tr>
<td>Logistics and Finance</td>
<td>X</td>
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</tbody>
</table>

Note: Definitions of the four pillars of food security are based on FAO’s definition in “An Introduction to the Basic Concepts of Food Security,” 2008. Availability refers to the availability of a sufficient supply of food. Access refers to the ability of individuals to acquire sufficient food. Utilization refers to the ability of individuals to utilize food to achieve a state of nutritional well-being. Stability refers to the stability of the other three dimensions of food security over time.
Post-crisis resilience analysis is unrealized. Therefore, the analysis is based on what has been learned (learning) by the authors to provide suggestions for improvement (transformation) of food system resilience in Thailand [23–25]. Other challenges affecting food system design are then analyzed, in particular the trade-off between the system goals and future risks for food security.

3. Impact of COVID-19 on the food system in Thailand

The COVID-19 outbreak in Thailand commenced in January 2020 and the government announced a nationwide lockdown and closed borders for the first time in late March 2020 (these measures were relaxed 3–4 months later). In the first wave of the outbreak, 4237 people were reported as infected. A second wave of the pandemic occurred from late 2020 to March 2021, affecting some areas of the country. As a result, lockdowns were announced for five provinces that had experienced outbreaks, with a total of 24,626 people reported to be infected. Later, a third wave occurred, in April 2021, resulting in the infection of more than 2 million people, as of December 2021 [26], and prompting the government to close down establishments, department stores, restaurants and announce the imposition of a curfew until the end of August 2021. The medical care and state quarantine systems were unable to cope with the situation, therefore, it was necessary to switch to home isolation by allowing those without severe symptoms to be treated at home [27]. The Omicron variant has caused a 4th wave of the Covid–19 outbreak in Thailand, with more infections after the new year 2022. However, the number of infections in the 4th wave was not as high as expected and the symptoms of those infected are less severe, and therefore, the government relaxed closures and containment measures. Figure 2 shows the level of measures taken by the Thai government to control COVID-19 in line with the

![Figure 2](image)

*Figure 2.* The Thai government’s responses to COVID-19 and daily new cases.
severity of the outbreak [28, 29]. The pandemic and the government control measures have resulted in a generalized economic recession. These factors and situations have affected the food system and caused food insecurity in Thailand.

Note: The Containment and Health Index is a composite index that is calculated from 14 component indicators include eight indicators related to closures and containment measures (namely school closures, workplace closures, cancelation of public events, restrictions on gatherings, reductions in public transport, stay at home requirements, restrictions on internal movement, and International travel controls) and six indicators related to health measures (namely public information campaigns, testing policy, contact tracing, facial coverings, vaccination policy, and the protection of elderly people). The Economic Support Index is a composite index that is calculated from two component indicators related to economic measures namely, Income support and Debt/contract relief for households.


3.1 Impact on factors of production

The COVID-19 outbreak has caused an increase in the prices of imported production factors because of the imposition of restrictions to contain outbreaks of the virus. This has been especially the case in chemical fertilizers, which have seen large price increases since the middle of 2020, due to the reduced production of raw materials for fertilizer production and the increase in shipping costs due to container shortages for international shipping [30]. For example, the Urea price increased (in USD per metric ton) from $216 in May 2020 to $418 in September 2021.

Thailand is heavily dependent on imports of chemical fertilizers, which comprise almost all of the country’s total use [31]. This means that the country’s food system will be unable to avoid the impact of COVID-19.

Thailand’s agricultural sector faces a problem of labor shortage because most of the country’s farms are small and labor-intensive. They also employ a large number of foreign workers, often seasonal migrant labor [32]. The closure of the borders to contain COVID-19 caused foreign workers to panic and many left the country and were then unable to return to Thailand [33]. In the first 6 months of 2020, there was a reduction of around 545,000 foreign workers in Thailand or 18.2% of the total usual number of migrant workers in Thailand [34].

The agricultural sector is also at risk of a shortage of funding for the production of the next cultivation due to losses and lower household income. The increased cost of inputs, with a decrease in revenue due to reduced demand for food (because the lockdown measures have caused the economic recession and have limited the travel of foreign tourists), will cause food producers to suffer losses [35]. In addition, 76% of Thai agricultural households rely on nonagricultural income and 75% of the households have members working outside the agricultural sector [36]. Owing to the recession, nonagricultural workers now have lower incomes and there is increased unemployment. This will cause the total income of agricultural households to decrease as well.

3.2 Impact on food production and processing

The first wave of the COVID-19 outbreak caused the GDP of Thailand’s agricultural sector in 2020 to contract by 3.3% compared to the previous year [37]. Factors
that contributed to the decline in agricultural GDP were border closure and lockdown measures [38]. However, effective control measures implemented in response to the first wave of outbreak increased the export of some food products, because Thai food products were trusted to be disease-free, while other food-producing countries had more severe outbreaks [39].

However, the second wave of the pandemic, which occurred at the end of 2020, centered on the fishing industry workforce cluster and the country’s large seafood wholesale market, severely affected seafood production and caused some countries to ban the import of seafood from Thailand [40]. Similarly, during the third wave of the pandemic outbreaks occurred in factories, including a large food-processing factory. As a result, the factories were shut down to disinfect and control the outbreak among workers, resulting in some food products being in shortage of supply for a period of time [41].

3.3 Impact on food stocks, market, and trade

In the macro view (national scale), food production in Thailand is sufficient to meet the needs of the country’s people. But in the micro view (household and individual scales), some people face the problem of not having access to food. The risk of spreading disease in restaurants, wholesale and retail markets of agricultural products caused the government to announce the closure of these places from time to time to limit the spread of the pandemic, resulting in the blockage of the usual food distribution channels [42]. Although the government allowed restaurants and food shops to offer take-home and home delivery meals, home dining behavior resulted in lower consumption than eating at restaurants and food shops. In addition, at certain times COVID-19 also affected food price stability in Thailand. For example, the lockdown during the first wave of the outbreak resulted in soaring rice prices [43] and public anxiety led to food hoarding, resulting in short-term food shortages [42].

3.4 Impact on food consumption

The border closure and lockdown measures greatly reduced food demand due to the disappearance of about 40 million foreign tourists and exports. The economic recession caused by the pandemic control measures resulted in many workers suffering a reduced income and unemployment. It is estimated that up to 6 million workers experienced a reduced income or unemployment [44], especially workers in the tourism sector. Affected people, especially the poor, unemployed workers, and vulnerable groups, have a reduced ability to buy food. A survey conducted by the International Health Policy Program found that as many as 85.4% of low-income residents in urban slums experienced food insecurity due to declining incomes, higher food prices, and difficulty in purchasing food [45]. Similarly, rural smallholder farmers engaged in monocultural agriculture were affected by the lack of channels to sell their produce. Reverse immigration of household members from the city to rural areas increased the pressure on rural households, due to increased household food needs [46]. These people experiencing economic hardships had to adjust their dietary habits by reducing their food consumption and switching to cheaper and less nutritious foods [45].

3.5 Impact on food logistics and finance

The COVID-19 crisis has affected the distribution of food by reducing the flow of food products and finance in the food system. Concerns about the spread of
pathogens through food transport have increased costs in food safety control processes. The closure of food retail and wholesale markets has resulted in higher food transportation and distribution costs due to a lack of distribution centers [47]. Higher food logistics costs hinder access to food for people with lower incomes and lower their purchasing power.

The lockdown has also prevented some groups of people from accessing adequate and quality food because alternative food distribution channels have not been developed to replace the old channels that have been closed. For example, patients or people who are quarantined under the home isolation system have difficulty going out to buy food because the authorities require that they must be detained at home. However, no alternative food supply system was provided for this group of people [48]. Closing schools and replacing them with online learning means that schoolchildren in poor families are not able to enjoy quality school lunches. People suffering from malnutrition have been unable to receive nutrients from medical services in hospitals because doctors and nurses have heavy workloads from caring for COVID-19 patients and also due to the cutting of the public health budget allocated for other diseases [3].

4. Food system resilience in Thailand

The COVID-19 crisis has prompted a response from various sectors to intervene in the food system to address food insecurity and improve the adaptation of players and elements in the system. This section comprises a review and analysis of the status of food system resilience in Thailand, both before and during the crisis. Lessons obtained are then used to suggest changes to Thailand's food system during the post-crisis period.

4.1 Factors of production resilience

4.1.1 Pre-Crisis

Thailand's food system is at risk of uncertainty. The agricultural sector has the highest number of poor people compared to other sectors. In addition, in this sector, the elderly account for 46% of the total workers and this percentage is likely to increase [49]. Half of the country's farmers do not own their land and 56% of farmers owning land possess less than 10 rai (4 acres) of land [50]. Land use for energy crops and nonagricultural activities is also increasing, and only 22% of agricultural land is irrigated [51]. Moreover, most agricultural activities are dependent on inputs from foreign producers and large domestic companies, such as producers of chemical fertilizers, pesticides, plant breeding, animal breeding, and animal feed [52].

In the past, the government has continuously issued various policies and measures to solve these problems, for example, taxation of land and buildings to reduce the problem of landholding without use; provision of the Sor Por Kor 4-01 agricultural land title deeds to the poor; re-zoning of agricultural land use and zoning of food crops and energy crops; and development of water management systems and expansion of irrigated areas [53, 54]. However, the solutions to the problems are still difficult to implement. As a result, alternative economy groups have offered food sovereignty as a solution as part of a campaign to enable small farmers to own food inputs independently of the monopoly of big business [55].
4.1.2 During the Crisis

To cope with the COVID crisis, the government has taken measures to alleviate short-term shortages of production factors, such as a project to support subsidies for farmers, a moratorium on debt, a reduction of debt burdens, and extending the loan repayment period for Bank for Agriculture and Agricultural Cooperatives customers [56]. The border closure measure was relaxed temporarily to allow the importation of workers to work in the agricultural sector [34].

4.1.3 Post-crisis

The lesson is that Thailand is at risk of facing food insecurity due to its high dependence on imports of food production factors from abroad, especially chemical fertilizers. At the national level, the development of the production capacity of agricultural inputs is therefore an answer to prevent shocks to the food system, such as the development of the domestic fertilizer industry or promoting organic agriculture to reduce the use of agrochemicals. At the base level, it is difficult for small-scale farmers to be self-reliant on all inputs. But if farmers cannot control or rely on themselves in terms of all the factors of production, there is a risk that food production will be disrupted in times of crisis.

4.2 Food-production and food-processing resilience

4.2.1 Pre-Crisis

Although Thailand can produce more food than the demand, the risk is that the agricultural sector has the lowest productivity compared to other sectors. The agriculture sector accounts for 30% of the workforce, but only 10% of GDP [57]. Most farmers are smallholders, resulting in low productivity because they cannot use high-priced machinery and have to rely on foreign unskilled workers. Most agriculture production is monoculture, resulting in low food diversity. Agricultural products in Thailand are concentrated on just 5 or 6 crops, some of which are non-food crops or those which are low in nutritional value. Vegetable farming occupies 0.9% of the total agricultural land use and concentrates on only eight types of vegetables [58]. In response, the government has promoted large farms to improve productivity and the use of agricultural technology. The Young Smart Farmer project was established to promote the new generation of farmers in the adoption of precision agriculture. On the other hand, some NGOs are trying to promote agroecological sustainable intensification [59].

4.2.2 During the Crisis

Rural areas with diverse food production or a food security system that had been set up in advance were less affected by the crisis. Meanwhile, urban slums offer less food security than rural communities and rural smallholders who cultivate monocultures, and consequently, are affected to a greater extent. Some communities (such as the Karen community, Ban Pa Tung Ngam, Chiang Mai Province) were not seriously affected by the outbreak and lockdown measures because they had a self-sufficient production system and there was a system in place for those affected to receive assistance. For example, highland hill tribe communities consist of largely self-sufficient
villages and have a culture of sharing food with the poor. These communities, in addition to producing enough food to consume in the community, can also share food with the people of other communities [60].

The outbreak also led to more qualitative improvements in food production, in particular a focus on the development of food safety standards [61]. Food production for export was also forced to develop safety and sanitation standards, especially fruit exports to China. In addition, the government requires large industrial plants to use “Bubble and Seal” measures to control the spread of the disease in factories [62]. This allows better control and limits the spread of the outbreak, but creates higher costs for entrepreneurs as well.

4.2.3 Post-crisis

The lesson is that the economy of scale is important to the competitiveness of food production, but the economy of scope is essential to food availability and utilization. A community that can produce its own food will be less affected by unexpected shocks than communities that are unable to produce food at all. And communities that are prepared in advance are better able to cope with crises than communities that are not ready. Development of the resilience of the food system must be done before the crisis.

4.3 Food stock, market, and trade resilience

4.3.1 Pre-Crisis

Under normal circumstances, the market mechanism plays a role in ensuring food availability, stability, physical access to food through the reserve, distribution, and trade of food. Food access channels for consumers in Thailand are diverse, ranging from modern trade, e-commerce, community markets, and hawker stalls to mobile grocery stores. However, the channels through which farmers can sell their food products directly to customers and retailers are still limited. The controversy about the market system of agricultural products in Thailand concerns oligopoly or exploitation by middlemen or large businesses. Big agribusinesses will purchase food products only on a contract farming basis with the condition that the farmers must purchase all their inputs from those businesses. On the other hand, the big agribusinesses argue that the mechanism is like a service and a marketing guarantee to farmers, most of whom lack marketing capabilities [63, 64].

4.3.2 During the Crisis

The COVID crisis has led to community adaptation. Community markets have been established on a local level by members of local communities for farmers to bring their products to sell locally, while some farmers have adapted to selling food products directly to consumers through networks of relatives and friends in cities and online systems or online marketplaces [65]. Meanwhile, some communities (such as Ban Pa Pae, Mae Hong Son Province) had already prepared food reserve systems to ensure that community members do not have shortages of the food products they need in times of crisis. For example, community food banks or rice banks, where people in the community stored rice in a collective barn for members to borrow for consumption, on the condition that it must be returned in kind, or as money, with interest in the following year [66].
4.3.3 Post-crisis

According to economic theory, fully competitive markets make food allocation and distribution more efficient. However, the agricultural markets in Thailand are not truly competitive [67]. Moreover, crises tend to affect food markets, to a greater or lesser extent. Therefore, having a food reserve system is essential for maintaining food security at all levels. In addition, the development of marketability, alternative channels, and reserve channels in selling the products of farmers and food producers are important steps, to create continuity in food production for smallholders and reduce food waste caused by unsold products.

4.4 Food consumption resilience

4.4.1 Pre-Crisis

The food access situation in Thailand is determined by economic factors rather than social factors. Thailand has reduced the number and proportion of the poor continuously. The number of people living below the poverty line has continued to decline from 34 million, or 65.17% of the country’s total population in 1988, to 4.3 million, or 6.24% in 2019, but there are still 5.4 million near-poor people or 7.79% of the country’s population. The Thai government has provided income benefits that are quite inclusive for nearly all groups, from child support subsidies up to the age of 6, school lunch subsidies, a pension for the elderly and the disabled, to a living allowance for the 14.5 million people who hold state welfare cards. Still, these programs provide a relatively limited amount of funding. Moreover, the identification of the poor is not entirely accurate, with inclusion and exclusion errors [68].

4.4.2 During the Crisis

The response to the impact of COVID-19 on food security in Thailand has emphasized the role of the government sector and demand-side interventions. For affected workers who are in the formal economy, unemployment compensation and cash transfer from the Social Security Fund will be provided. But Thailand also has a large number of informal workers, comprising around 54% of the labor force [69]. The government therefore issued economic remedial measures to address the impact of the pandemic and lockdown measures, including cash transfers, conditional cash transfers, reductions in public utility costs, a debt moratorium, and expansion of soft loans for businesses to maintain employment and maintain people’s ability to access food.

However, the government aid measures are not enough. Most of them are short-term measures, lasting only 2–3 months during the lockdown. But the economic recession has caused a large number of people to be unemployed and revenues have declined for a longer duration than just during the lockdown period. During the first wave of the pandemic, 30.5 million people, or 40% of the country’s population, received cash transfers. However, even though the government’s cash transfer measures have covered a large number of people, as many as 3 million people are still missing out on the state aid measures. These include marginalized people, bedridden patients, and those who cannot register for assistance [70].
4.4.3 Post-crisis

The lesson is that tackling poverty and inequality including income insurance (unemployment insurance) is an important factor in reducing the impact of the crisis and maintaining people’s ability to access food. But a large number of informal workers creates asymmetric information problems, which prevents governments from helping people affected by food shortages. It also forces governments to take universal measures, which is ineffective in budgeting. The question is, for a developing country like Thailand with a large informal economy, how can the lack of information and income insurance for the poor, marginalized, and other vulnerable groups be solved?

4.5 Food logistics resilience

4.5.1 Pre-Crisis

Thailand lacks planning or preparation of systems for dealing with different types of crises, in particular, a system for allocation of aid and distribution of food and necessities to those affected by crises sufficiently and thoroughly. In several past crises, government measures to address food insecurity have been often ad hoc and failed to provide food for all of these vulnerable groups. Businesses and civil societies, therefore, had to come in and fill the gaps in food systems. However, it was often scattered, redundant, lacking in continuity and organization [71].

4.5.2 During the Crisis

The cooperation of government, business, and civil society has a role to play in closing the gaps in state measures that are inaccessible to some vulnerable groups. Civil society organizations that were taking care of vulnerable groups before the crisis play an important role in providing food through community kitchens and food banks to groups that often do not have access to government aid measures [72]. Networks of civil society organizations also play a role in matching food supply and demand, by purchasing food from smallholder farmers who are unable to sell their products for sale or distribution to people who need food [73]. Likewise, the armed services, including the air force and army, help facilitate food exchanges between far-flung communities, for example, using planes to transport rice products from hill tribe communities in the north in exchange for dried fish, which is a food product of maritime communities in the south [74].

Business organizations’ Corporate Social Responsibility activities include the distribution of supplementary food to different groups of people, as well as encouraging people to participate in food donation campaigns. One form of food donation that was very popular in the first wave of the outbreak was “Happiness-sharing Pantries”, placing cupboards in public places for people to donate or pick up food to consume [75]. However, the assistance was done by various groups of people in an ad hoc way, and there was no central cooperation and organization of assistance systems so that they were comprehensive, adequate, and continuous. One problem with the Happiness-sharing Pantries projects is that some people took all the food from cupboards until there was nothing left to share with others. This problem caused donors to become discouraged and eventually ended the project [76].
4.5.3 Post-crisis

The lesson is that cooperation between government, business, and people sectors is essential to building food security, especially the provision and delivery of food to vulnerable groups. A civil society organization that works closely with a particular community on an ongoing basis will access information on vulnerable groups and will serve as a mechanism that allows food to be delivered to those people who are in real need. But in the macro view, information systems about vulnerable groups and food aid delivery system design are required to make assistance available to everyone. Moreover, ensuring people’s food security should not be merely seen as a relief, but should also develop food self-reliance.

5. Challenges of building food system resilience in Thailand

Building food system resilience for food security in Thailand also faces challenges due to a trade-off, or conflict, between several issues, described in the following section.

5.1 Market vs. self-sufficiency

Controversies about food systems inevitably emerge during every crisis, when difficulties are created and many people are exposed to food insecurity risks. Proposals on the food system in Thailand vary between the two extremes of a continuum, self-sufficiency and free trade. The main controversy focuses on whether the Thai agricultural system should be one of market agriculture, which focuses on production for sale in response to market demand, or self-sufficiency agriculture, which focuses on production for one’s own consumption. If there is any leftover produce, then this can be sold [4].

The supporting rationale for the market-based production system is to create wealth through specialized production, which enables efficient use of economic resources. Market-based production provides food security because food production increases and prices are lower while consumers still have access to a variety of quality food through market mechanisms [77]. The potential negative aspect of this is that farmers who do not improve productivity could suffer lower incomes, putting them at risk of food insecurity.

However, it is argued that, under normal circumstances, the system of global food trade is not fully free and competition is not fair due to the implementation of measures to protect domestic agricultural markets and subsidize farmers within developed countries. In times of crisis, market mechanisms may fail, to the extent that farmers cannot rely on outside markets. Market-based production also makes the structure of food production homogenous. This makes it more dependent on food imports from foreign countries or from outside the area, which then increases the risk of food insecurity [78].

On the other hand, self-sufficiency production focuses on producing more diverse foods, which reduces the risk of food insecurity [79, 80]. The self-sufficiency production system also focuses on mixed farming and animal husbandry by imitating nature, resulting in high quality and safe food production. It also creates food sovereignty by reducing dependency on imports and inputs from large companies and maintaining the fertility of the soil, as well as water and ecosystems. However, the efficiency,
competitiveness [81], and producer motivation of self-sufficiency production have been questioned, because it is seen as requiring farmers to adopt a plain lifestyle without many amenities.

5.2 Macro versus Micro

There is a question about what level the unit of analysis on food security should be: individual, household, community, national or global. In the past, the food security concept emphasized a unit of analysis at the macro level, considering global or national food security. This can be observed from definitions, debates, policies recommendations, and the design of food security indicators, which generally focus on the national or international context, for example, the debates about whether to liberalize food trade or not and the development of international comparative food security indicators. Subsequently, there has been an increase in interest in food security at the micro level, that is at the community, household, and individual scales [14, 82].

Macro-level food security will ensure everyone in the world or an individual country has the opportunity for food security, but that does not mean it will always lead to micro-level food security, especially in times of crisis where food transport is limited or market systems have failed. Emphasis on achieving food self-sufficiency at the national level may distract governments from addressing food security at the household level [83]. Ensuring macro-level food security is often the role of the state, but, in practice, governments are often unable to ensure food security for all citizens because too large a unit creates asymmetric information problems. On the other hand, micro-level food security practices will help fill gaps that the government has failed to cover and alleviate the burden on the government [84]. There is still an argument that it is not possible, even at a national level, to be self-sufficient in all types of food [85]. The question is what is the optimal size of the analytical unit? Is it small enough to ensure that everyone is cared for and large enough to provide adequate food in terms of quality and quantity? In fact, food security at the household and individual levels cannot be guaranteed without national food security. Therefore, building food security may need to be undertaken at all levels but the question is how each level of food security should be organized.

5.3 Efficiency versus Stability

A common phenomenon in Thailand is that the countryside serves as a social cushion in times of crisis. Under normal circumstances, many rural people migrate to cities in search of the better economic opportunities that they offer in comparison to rural areas. But every time there is a severe crisis, to survive, people migrate back to their rural homelands [86, 87]. This can be seen in the COVID-19 crisis, where, in the first wave of the outbreak in February–April 2020, it is estimated that 2 million people migrated back to the countryside, and, in the second half of 2020, a monthly average of 200,000 migrated back to the countryside [46]. However, this does not mean that everyone in the city has a country house to migrate back to. Consequently, many people in crisis-affected cities are still at high risk of food insecurity.

At present, the idea of urban farming is gaining more and more attention. But there is a question regarding whether it is necessary for households or urban communities to produce their own food. The price of land in the city is high, therefore, urban food production has a very high opportunity cost compared to rural food production.
However, urban food production has advantages in terms of transportation and logistics costs. Would using urban land to produce food be more cost-effective than buying food from the countryside? On the contrary, if there is no preparation for hedging at all, urban communities will also suffer a lot of damage when a severe crisis occurs. An interesting question is what should be the cost of hedging for food insecurity risks? The risk management principle states that the cost of hedging is equal to the likelihood of a crisis multiplied by the impact of the crisis. In history, severe crises are likely to occur only occasionally, or infrequently, but if they happen, the impact is so severe that there are many deaths. However, the changes in today’s world may be a catalyst for more frequent crises and increase the need for hedging.

Chareonwongsak [88] states that the world has entered the “Pandemic New Normal” era, where pandemics will become more frequent so that it becomes a new normal. The world is more connected and more people live in cities, making pandemics easier to occur and spread faster. This is consistent with the “IPBES Workshop Report on Biodiversity and Pandemics,” which indicates that future pandemics will occur more frequently, spread faster, and inflict more damage [89]. There is the possibility of a black swan or an unprecedented crisis because there are new predisposing factors, such as severe climate change and cyber-attacks on countries’ financial systems or food chains [90].

6. Suggestions on building food system resilience in Thailand: the FSSC model

The fact that Thailand is a food producer and net exporter makes food security issues seem less of a concern. But the spread and impact of COVID-19 have helped to reveal the fact that the food system in Thailand is still vulnerable to food insecurity for many people. It also reveals the country’s under-preparedness to deal with crises. The weakness in the Thai food system is that the Thai government lacks information about people at risk of food inaccessibility due to the large proportion of informal workers while most of the workers in developed countries are formal workers. The government mainly uses macro-level measures, namely cash transfer, to address food inaccessibility. But there is a lack of an alternative system to distribute food to people who have not received help. In a world where crises are more frequent, food system resilience needs to be built to face crises of all forms and levels of severity as well as maintain food security for everyone, therefore, an innovative food system model is required. The food system must be developed at both the macro and micro levels and have the ability to maintain food security in both normal and critical times without exorbitant cost.

The FSSC model presented in this chapter is a proposal for developing food system resilience to protect food security in Thailand. This concept developed from a stream of several concepts—the Mid-stream economy [91], Self-sustained communities [92], and the Linked self-sustained communities [92], applying these concepts in the context of building food security.

This concept stream consists of four main components. First, strength-based production and liberalization of food trade to create wealth during normal times. Second, self-sufficiency in food in times of crisis and at all levels. Third, preparation of a switching mechanism/policy design for readiness in changing the mode, between liberalization in normal situations and self-sufficiency in times of crisis. And fourth, the interconnection of food systems between communities and between all levels to ensure food security at both micro and macro levels.
The development of the FSSC aims to make area-based communities self-sufficient in food in times of crisis for a number of reasons. First of all, future crises could limit domestic and international food trade and transport. For example, a hyper-inflation crisis or a cyber-attack on the financial system of the country or the world could make it impossible to use the money to buy food. Future pandemic crises could also force governments to use lockdown measures and close borders.

Secondly, the food system at the household level is usually too small to be self-sufficient in food. Meanwhile, countries are too large to be aware of all information and to allocate timely assistance to all people during crises. Therefore, a community that is not so small that it cannot be self-sufficient, or so large that members are not related to each other, is the right unit to maintain food security in times of crisis.

Thirdly, building food security in communities in times of severe crises (which lead to food system failures through wars, disasters, hyperinflation, and similar events) must temporarily integrate all food system activities in the community, to shorten the food supply chain and to build the ability to supply enough food to the people in the community for a given period of time.

Fourth, communities should be self-sufficient in food only in times of crisis in order not to lose the opportunity to create wealth from carrying out economic activities according to the strength of the community during normal times.

The creation of the FSSC has the following strategic proposals:

6.1 Promoting integration into FSSC

FSSCs may be built on the base of existing area-based communities or create new ones by bringing together groups of people who are related and share the common intent to create an FSSC. FFSCs may develop on the concept of Work-Life Integration [93], by creating communities that facilitate people working and living in the same area, as well as the benefit of preventing the effects of epidemics that may occur in the future.

6.2 Designing food systems in the community

Ensuring that communities have enough food in times of crisis must come from setting goals. How many members does the community have? How much food, and how many different types are needed? How long should a community supply food to its members during a crisis? Communities must design and plan in advance where, in times of crisis, they will get their food from, what to produce, how to produce, how much, how to stock input and food products, and how to allocate food products to community members. However, the design of a community food system requires consideration of the conditions, constraints, and context of each community.

6.3 Joint production planning in the community

FSSC may be the solution to the problems in the Thai agricultural sector with many small farmers and elderly workers. FSSC promotes the integration of agricultural farms for joint production planning, procuring, and sharing inputs and resources, including the use of technology and agricultural machinery together which will create an economy of scale. At the same time, farmers in the FSSC may plan to produce a variety of yields to distribute products together and share revenues
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together. This will allow the community to produce a variety of food products. It also creates an economy of scope and diversification of risks.

6.4 Developing the FSSC system and infrastructure

Developing FSSCs to be able to switch to self-sufficiency, community systems, and infrastructures needs to be done in advance, such as community water storage, community seed banks, community gardens, community alternative energy generation systems, community food banks, community markets and food allocation systems, community data management and information systems (such as projections for production, stock, and community food needs), and community savings promotion and welfare systems.

6.5 Promoting education and R&D on FSSC

FSSC’s food production may be unique and differ according to the context and limitations of each community. In times of crisis, where communities cannot rely on sources or agents outside the community, the FSSC food production system tends to be a closed-loop food system, where the outputs and waste from one activity are inputs to other activities until it becomes a cycle or ecosystem. Food production in urban communities with limited space, technology, and methods needs to be developed to optimize the use of space. Also, training for members of the FSSC and the promotion of food system-related R&D in the FSSC needs to be supported.

6.6 Community development based on the strength of the community

In normal times, each FSSC should have a development and production approach that matches the strengths of the community. Each FSSC development should not have the same pattern or produce the same goods and services over and over. But each community should be developed according to its strength, ideology, wisdom, identity, value, image, and uniqueness. Thus, each FSSC will have a unique selling point that will enable it to create more added value for its products and services. Then, a strong economy in a community can also be a better shield against the impact of a crisis.

6.7 Design and preparation of switching mechanisms

The FSSC food system should be developed to be as competitive as possible under normal conditions to enable the FSSC to be able to produce and sell food continuously, without much subsidization or intervention. However, during normal times, it is not necessary for every FSSC to produce all its own food requirements. But a switching mechanism must be designed and prepared to be able to supply food to the entire community in the event of a crisis, such as preparation of a community food reserve system, transformation of vacant spaces in communities and individual households into food production areas, changing the type of food produced to be more versatile, faster yielding, changing cultivation methods for higher yields (despite the fact that the product characteristics may not be as beautiful as before, such as smaller fruits, thinner vegetables), etc. The switching mechanism encompasses the development of leadership, management, morals, and community systems such as structure, processes, rules, and culture that encourage community members to be willing to switch to a self-sufficiency mode.
6.8 Connecting FSSC networks

In fact, it is unlikely that each community will be able to produce food for its own consumption forever without having to rely on the world outside the community at all. Therefore, FSSCs should establish a network to link with other FSSCs and to enable the trading, exchange, and sharing of knowledge, resources, products, and risks. For example, food production planning between communities, the development of food supply chains between communities, the development of food logistics, information and finance between communities, the organization of knowledge sharing and resources among the communities, and the development of food exchange and sharing systems among communities in times of crisis. The link between FSSCs will help support the development of communities in normal times and increase the ability to self-sufficiency and restoration of the community’s food system in times of crisis.

6.9 Developing FSSC promotion policy

Governments should develop national policies to promote FSSC, including academic and financial support for FSSC transformation, developing prototypes and learning centers for FSSC in both urban and rural areas, designing urban development and building a community that integrates both workplaces and living facilities in the same area, land use planning and zoning of food production, developing information systems for food system management at the national level, developing early warning systems, developing public-private cooperation systems for food production and distribution in a systematic, thorough and continuous manner, developing international food security cooperation, and the development of food diplomacy.

7. Conclusion

The COVID-19 crisis has affected food security and revealed the shortcomings of the food system in Thailand. The FSSC is an innovative idea resulting from the synthesis of the good points of various food economy systems, with the aim of ensuring food security in both normal and critical times. The development of FSSCs also emphasizes preparation to prevent the impact of crises on food insecurity in communities without creating excessive expenses or opportunity costs. In normal times, FSSCs can also connect to the global market to produce goods and services according to their strengths to create wealth. But communities are designed to be ready to adapt to self-reliance in times of crisis.

However, the FSSC model is still just a concept and it has never been implemented in practice. In addition, the concept development took place from the consideration of Thailand’s context, which is a country capable of producing enough food to meet overall domestic demand. Therefore, in applying this concept to other countries with different contexts, it is necessary to adapt it appropriately to the local context. Developing FSSCs involves not just the design of food systems, but the design of communities, which is more complicated because it has to take into account the economic, societal, and political dimensions in each community and also the motivational dimensions, relationships, and other dimensions of human beings. Finally, the FSSC model also needs studies, research, and experimental development of the prototype to improve the model for practical application.
The FSSC model and its associated thoughts have overlays and differentiated parts from City Region Food Systems (CRFS) supported by RUAF [94]. Both concepts have the same goals, namely food security, sustainable development, economic development, and social inclusion and equity. FSSC has a focus on improving area-based community food security and extending communities’ connectivity. CRFS focuses on improving the food security of the city-center food system that is linked to the surrounding area. By successfully pushing the FSSC model, it is possible to learn from the CRFS, for example, building cooperation and inclusive participation, formulating an academic-based development strategy and taking into account the context of the food system in each area, developing the capacity of individuals and organizations involved, and building effective systems to drive the development.

Acknowledgements

The author acknowledges the support of the Nation-Building Institute and Institute of Future Studies for Development.

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Self-Sustained Communities: Food Security in Times of Crisis
DOI: http://dx.doi.org/10.5772/intechopen.104425

References


[49] Tansri K. Labor and Changes in the Thai Agricultural Sector. Bank of
Self-Sustained Communities: Food Security in Times of Crisis
DOI: http://dx.doi.org/10.5772/intechopen.104425


[73] Business B. ‘Food Crisis’ Fragility in Big Cities in the Situation of ‘Covid 19’.


