CACCI
Food & Agriculture Newsletter

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Message from CACCI Director-General

As Director-General of CACCI, I am pleased to present the fourteenth issue of the Newsletter of the Asian Council on Food and Agriculture (ACFA) to all our colleagues in the food and agriculture sectors, and other CACCI members and associates.

This issue highlights the trends, the latest news and interesting reports on food and agriculture in the Asia-Pacific region. I hope that you will find the articles included in this Newsletter of great value, and look forward to your contribution to the Newsletter in the future.

As many of you may know, this Council has been a valuable platform for information exchange and networking for all representatives from the region's food and agriculture industries. Therefore, all CACCI members are encouraged to take advantage of the Council and the Newsletter as channels to voice their opinions and viewpoints.

My Best Wishes

Ernest Lin
Director-General
The Confederation of Asia-Pacific Chambers of Commerce and Industry (CACCI)

The Data Revolution That Can Transform Food Production Has Arrived

By Karen Reijnen, Director of Innovation at Rainforest Alliance

A key part of making farming sustainable in the future is ensuring that farmers make enough money to support their families and become more resilient to future shocks. Technology is already helping with that. Photo: Pexels

Mobile payment systems, artificial intelligence, blockchain — such digital innovations have exploded in the last few years, and with good reason. Their capacity to harness vast amounts of data means they can improve transparency and decision-making for all kinds of industries — not least of all, for food production.

The current pandemic has exposed how vulnerable global supply chains are to disruption. These technologies not only have the potential to push entire food supply chains — all the way from farmer to consumer — toward greater sustainability, but they can also help improve resilience to future shocks.

Data-Based Farming

If we want to continue feeding the world's ballooning population and preserve the world for future generations, we must make farming environmentally sound and socially responsible. In short, we want farming that can be sustained into the future.

A key part of that is ensuring that farmers can make enough money to support their families and become more resilient to future shocks. Technology is already helping with that: Precision farming, for example, employs sensors, robots and IoT-powered devices (computing devices that wirelessly connect to a network and transmit data) to take over some day-to-day farming chores. This frees up farmers to focus on long-term planning and profitability.

Unfortunately, most of the world's 500 million smallholder farmers (who manage 75% of the Earth's agricultural lands) don't have access to those potent technologies. But they, too, can benefit from innovations, such as mobile apps like FarmGrow, which was developed by the Rainforest Alliance with the Grameen Foundation in Indonesia, Ghana and Côte d'Ivoire for smallholder cocoa farmers.

By creating a seven-year business plan based on individual household data and the agronomic status of each cocoa plot, FarmGrow offers tailor-made, ongoing recommendations to increase sustainability and productivity — and therefore, profitability — on existing cocoa land. The app's remote-sensing and artificial intelligence features further help farmers to know, for example, where sickly trees may be located or where farm borders could be encroaching on forests; they also track production and help farmers make better decisions.

Enhancing the Quality of Audits

Technology is improving on-farm audits, which are the investigations that are conducted periodically to verify if farms are complying with certification requirements. Conventional audits, which rely on manual checks of farms, have no way of determining, for example, where forests previously stood on the outskirts of farms. GPS maps of farm locations, combined with satellite imagery and maps of protected areas, now make it possible to detect deforestation and even pinpoint the areas at the greatest risk for future deforestation.

We can see if farms are too close to the border of a national park or if crop planting is getting too close to water bodies. This kind of data allows for more targeted advice and training on the ground, while also making in-person audits more efficient and effective.

Blockchain Creates Better Food Chains

Blockchain is perhaps best known as the technology employed by bitcoin and other cryptocurrencies, but its applications go well beyond online payments. This tamper-proof public ledger, which provides a permanent and unalterable record of transactions, is making its mark on food supply chains, as well.

It can, for instance, be used to track where an ingredient was sourced and the amount of carbon it generated before ending up on our plates. With companies increasingly facing pressure by governments, consumers and non-governmental organizations to disclose more information about their supply chains, many are starting to test blockchain for increased transparency and traceability. This could help identify potential risks in supply chains, provide insights into supply-chain efficiencies and track sustainability progress. IBM Food Trust, a high-profile blockchain-based food traceability program, can trace food back to its source in a few seconds. Agribusiness giants Carrefour and Walmart have signed on to use it and have begun asking suppliers to upload data and insights about the products sold in their stores.

Connecting Producers and Consumers

Technology is also helping connect consumers to the origins of the products they purchase. Quick response (QR) codes on packaging are increasingly giving consumers a fast way to find out, through their smartphones, the origin of a product's ingredients or its journey from source to shelf. Another exciting innovation is the Circular Supply Chain initiative, which lets consumers send a direct tip to producers who are working sustainably. Or, look at the leading Dutch food retailer Albert Heijn, which is using QR codes to provide consumers with a map tracing the journey of orange juice and even including the percentage of juice that comes from certified orange groves.

These and other emerging technologies — such as artificial intelligence, 5G, augmented and virtual reality — are likely to transform supply chains in the years to come. All players in the food supply chain must work together to ensure that these technologies catalyze an era of more responsible farming. We need future farming to be environmentally and socially sound, to drive more value to both producers and consumers and to help achieve a more resilient future.

About the Author:

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Karen Reijnen leads the team that drives innovation for the Rainforest Alliance. Over the past 12 years, she has worked in private sector development and sustainability programs in Africa and Asia.

Brink

Beyond the Pandemic: Harnessing the Digital Revolution to Set Food Systems on a Better Course

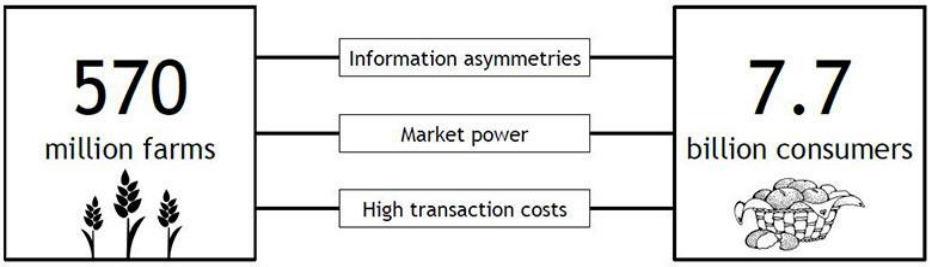
By Julian Lampietti, Ghada El Abed, and Kateryna Schroeder

One of the most striking images of the coronavirus pandemic is the contrast between farmers dumping milk, smashing eggs, and plowing vegetables back into the soil and consumers facing empty store shelves and long lines at food distribution centers. How is it possible to have over-abundance on one hand and scarcity on the other?

This article argues it is vital to correct pervasive information asymmetries and transaction costs across a vast food system (Figure 1) to move toward a more inclusive, resilient and sustainable model. While large-scale industrial food production accompanied by just-in-time supply chains have produced many gains, the hazards of this system are increasingly visible on the horizon. The digital revolution offers the possibility of an alternative equilibrium, one where small-scale, flexible organizational and production systems flourish and nimbly navigate a changing operating environment. Small and interconnected may well be our salvation: the hundreds of shallow-draft ships that saved the day in Dunkirk, during World War II, when troops were pinned to the coast and large personnel carriers were no longer seaworthy, come to mind.

All of us, 7.7 billion and counting, participate in the food system in one way or another. We make decisions about the food we consume, the clothes we wear and the products we use – much of which originate in agriculture. Agricultural goods are produced on 570 million farms, most of them small, run by families, and located in developing countries. Food systems are local, an essential feature in communities—but also global, linked through trade and sophisticated financial and insurance markets.

Figure 1: Information Asymmetries and Transaction Costs Plague the Food System

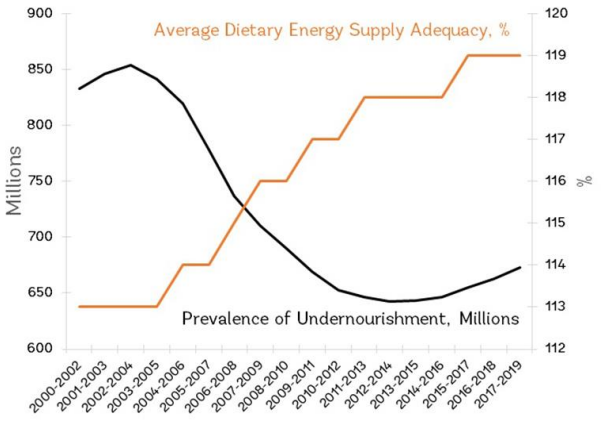


Source: World Bank

Despite providing food for a world population that has more than doubled over the past 50 years, the food system is severely off course in helping us achieve Sustainable Development Goals related to hunger, poverty, health, land use and climate change. Although we're producing plenty of food globally, the number of undernourished has been rising since 2014 (Figure 2). One in five children under the age of five is stunted producing lifelong negative consequences on productivity. Some two billion people are overweight or obese, resulting in noncommunicable diseases of dietary origin that compromise resistance to new diseases such as the coronavirus. Agriculture contributes 24 percent of greenhouse gas emissions, consumes 70 percent of fresh water, and has caused the loss of 60 percent of vertebrate biodiversity since the 1970s. The cost of these negative externalities is $12 trillion according to the Food and Land Use Coalition, outweighing a market value of $10 trillion.

Now, an additional 100 million people are under threat of poverty because of the economic impacts of the pandemic, according to the June 2020 Global Economic Prospects report, pushing us further from our goals by shrinking incomes and creating food and nutrition access challenges that may result in large-scale famine according to the World Food Programme.

Figure 2: The Food System Is Not on Course to End Hunger



Source: FAOSTAT (2020)

How can we set a new course for the food system – one that reduces hunger and delivers healthy people, a healthy economy, and a healthy planet?

Imagine the planetary system on which the food system depends as an overloaded boat becoming increasingly 'tippy' with each additional piece of cargo – population growth, climate change, loss of biodiversity, pollution, land degradation and so on. With two food security crises in a decade, albeit of completely different origin, we're wobbling and getting closer to the tipping point. And solving this won't be accomplished by only jettisoning the latest piece of cargo – the coronavirus. Multiple factors need addressing. Fortunately, Mother Nature is amazingly resilient and, combined with human ingenuity, will enable us to recover from the current crisis, as it did from previous ones. Let's take it as an opportunity to shift the course of the food system.

Today, the rapid development and deployment of digital technologies and networks promises to accelerate food system transformation by overcoming long-standing market and policy failures. Earlier course shifts in agriculture and food industries, marked by several agricultural revolutions, raised agricultural productivity, increased food supply, reduced real food prices, helped free up labor and capital resources for investment in other sectors, paved the way for urbanization and the industrial revolution, and led to the corporatization of agri-business. Unlike prior revolutions that originated with on-farm innovations before spilling over to rural communities, and then firms up and down the value chain (think of the use of the cast iron plough during the British Agricultural Revolution; or enhanced seed and fertilizer packages during the Green Revolution), today's digital innovations are promoting efficiencies at multiple points along the food value chain.

Digital technology drives change on multiple fronts at accelerated rates by collecting, using, and analyzing massive amounts of machine-readable data about practically every aspect of the food system at nearly zero marginal cost. Digital platforms from Alibaba to YouTube are disrupting traditional business models across the system and Venture capital investors poured $2.8 billion into agtech startups across the globe in 2019.

But digital innovation is only as good as its purpose. To yield positive outcomes, public policy must boost complementary infrastructure and human capacity, address gender access disparities, and pay close attention to environmental benefits -- all salient issues that our

forthcoming report "Digital Acceleration of Agricultural Transformation" will delve into when it is published in late 2020. In this article, however, we focus on just three recommendations to accelerate the shift towards a more sustainable food future. Public policies should seek to *D*e-concentrate markets and supply chains, *D*ecentralize traceability, and *D*isseminate data.

The first D: De-concentrate markets and supply chains

The contrast between food surplus on farms and food shortages in retail markets during COVID-19 lockdowns highlighted high transaction costs and information asymmetries that have long plagued the food system. Highly concentrated and segmented markets and supply chains generate enormous efficiency gains but make it hard and costly for sellers and buyers to find each other and transact. Concentration can take many shapes and forms – from concentrated physical markets to concentrated market shares. Both are perilous, particularly in times of crisis. The Titanic was the biggest, most luxurious state-of-the-art passenger ship when she set sail on her maiden voyage. Everyone thought it was "too big to sink" and we all know how that ended.

In Peru, 80 percent of merchants at a major central fruit market in Lima tested positive for coronavirus. Although it was identified as a point of contagion, authorities felt they could not afford to close the market because it would result in significant food shortages. In the United States, the retail food sector is increasingly concentrated in a small number of large companies (Figure 3) that may be less agile in adapting to changes in consumption patterns and less resilient to demand shocks. Still in the United States, the impact of coronavirus on meatpacking workers underscored the scale of meat operations and the very high market concentration of the meat industry, with impacts from closed meat packing plants in Illinois rippling up and down the supply chain. These problems will likely only get worse as trends toward increasing concentration and segmentation are accentuated by geography and trade politics, contributing to the unique coronavirus-induced surpluses and shortages we are experiencing today.

Digital platforms can help de-concentrate and increase the number of markets up and down the food system leading to better outcomes at either end of the supply chain. A study that compared transaction data from a digital platform with physical commodity auctions held weekly, and farm-gate prices in the coffee producing regions of India, found that producers obtained significantly higher prices when they sold the commodity through the digital platform rather than at the farm-gate through brokers. Alibaba's Taobao online marketing platform described in a recent IFPRI blog is another case in point: The county of Shuyang, where 86 of China's 4,310 Taobao Villages are located, has undergone "a dramatic transformation from one of the poorest counties in Jangsu province to a well-off landmark for agricultural e-commerce in China." Thanks to a thriving horticulture industry backed by e-commerce, the county's GDP surpassed $11 billion in 2018 and 41,000 people were lifted out of poverty.

Figure 3: Retail food markets in the US are thinning

Source: USDA ERS, Calculations from U.S. Census Bureau Monthly Retail Trade Survey, Industry reports; It is updated and adapted from Steve Wood, Revisiting the US food retail consolidation wave: regulation, market power and spatial outcomes, Journal of Economic Geography, Volume 13, Issue 2, March 2013, Pages 299–326

In the wake of the pandemic, many local authorities and private operators have fast-tracked the move to digital platforms to connect producers and consumers stymied by physical lockdowns: In the state of Kansas, in the United States, social media helped connect ranchers and consumers looking for quality beef after the coronavirus had emptied local meat counters. In India, the Odisha Rural Development and Marketing Society initiated a system for doorstep delivery of vegetables by producer organizations, using point-of-sale machines for digital payments and electronic weighing machines. Working in partnership with Odisha Livelihoods Mission, Mission Shakti, partner NGOs, and district officials, the society quickly put in place a delivery model and arranged vehicles and passes from the police for transporting the vegetables, giving more people access to fresh vegetables while protecting farmers' livelihoods. In Kenya, the pandemic is giving a boost to companies that had already taken the leap toward digital. Launched in 2014, Twiga Foods, for example, is a mobile-based business-to-business digital commerce platform that matches small-scale supply and demand for fruits and vegetables and cuts out layers of middlemen, thereby eliminating waste and reducing food prices for mass market end-consumers. An IFC client, the company is using the same technology to make it easier for consumers to access food during the pandemic.

While these digital solutions provide a beacon of hope amid stories of supply chain breakdowns during COVID-19, how robust will their model prove in the long term?

The key going forward is to carefully consider the balance of private and public interests in the de-concentration of platforms in the food system. This is not a new issue – consider traditional farmer's markets or wholesale food markets. Both provide physical platforms

where producers and consumers interact. What is it going to take to scale this up and make the entire process virtual? The number of markets will increase, affording producers and consumers more options, and so will efficiency through cost reductions. Consider cattle auctions, where traditional physical exchanges are being replaced by on-farm cameras and in-house monitors facilitating greater market participation and significant logistical and animal health costs savings. At the same time, the increased flow of information on every process and customer along the agri-food value chain, underpinned by digital verification, will make it easier to certify the trustworthiness of an economic agent and strengthen trust in transactions. Scaling-up the food system through digital platforms is a no-brainer so long as careful consideration is given to the economic and societal impact.

The role of public policy is to prevent accumulation of market power by digital platforms. It is currently unclear whether digital platforms are creating new, highly concentrated market powers that favor incumbents or whether transparent competition is enabling a fair distribution of value.

On the one hand, several factors contribute to increased concentration in digital platform markets such as economies of scale, switching costs and network effects. Consider Alibaba or Amazon, companies that have grown exponentially in the last decade and are producing a market for consumers and producers to interact across the globe. On the other hand, economist Barbara Engels makes the case that digital platforms support competition. She argues that product ranges (such as sales of varieties of apples by different producers) provide for competitive conditions and that platform market conditions are regularly disrupted by innovation (new varieties of apples displacing established ones as market reach expands) and so are perhaps less susceptible to the accumulation of market power as more conventional exchange mechanisms. This has not been proven for the food value chain and justifies further research.

The second D: Decentralize traceability

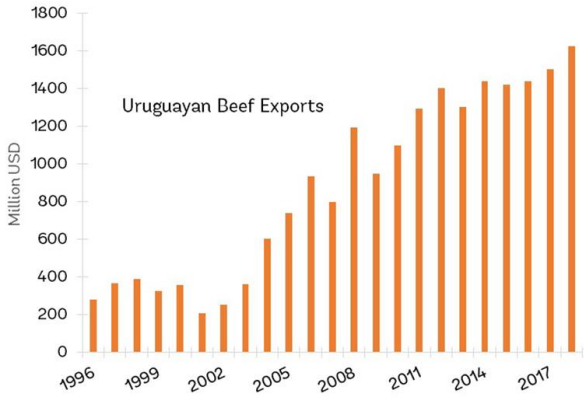
Like previous zoonotic diseases such as HIV/AIDS and West Nile Virus, COVID-19 has brought to the fore the strong linkages between animal health, human health and planetary health, and the important role that human activities play by putting people in closer contact with wildlife. Poor management of livestock, unsafe food handling, ecosystem degradation and encroachments on wildlife habitats are responsible for a growing number of ills and illnesses.

Tracing food throughout the supply chain in a decentralized manner creates opportunities for safer, more sustainable food. Safer sourcing of food is important because some 600 million people fall ill after eating contaminated food each year, costing low and middle-income countries $110 billion in lost productivity and medical expenses each year. Knowing where food comes from and how it was produced allows consumers to make more informed decisions about the impact of the food they consume on their health and the health of the planet. More sustainably sourced food also earns a price premium from environmentally and health conscious consumers who can afford it. This price signal, when transmitted to various actors along the value chain, could in turn incentivize sustainable production practices.

In Uruguay, cows are assigned identification codes and tracked throughout the supply chain. Credit: Flore de Preneuf/World Bank

Consider Uruguay, where growth of beef exports rose an average of 700 percent between 2001 and 2018 (Figure 4). Rising incomes and shifting preferences have been fueling a hunger for beef with a certified provenance that is synonymous with high quality. Uruguay was able to sate this appetite for premium products thanks to a government that had the foresight to respond to a Foot and Mouth disease epidemic in the early 2000s with improved livestock management practices and the development of a digital information system for livestock information that is free for all users.

Figure 4: Traceable high-quality beef exports are rising



Source: COMTRADE 2020

Critical to the long-term success of this system is the de-centralized design of the distributed ledger, meaning anyone can access the system and use the data, reducing information asymmetries, increasing competition at different nodes, and increasing resilience to fraud and falsifying information. The system used in Uruguay assigns an identification code to each animal, letting you know its treatment and location on the

production chain in real time. Information on individual cows is tracked from farm to freight-on-board, including their travel, feed, medicine and weight-gain, among other indicators. Users not registered in the system can view maps of operators using the system and identify individual cattle by department.

Open access distributed ledger technologies have the potential to transform food supply chains, fingerprinting location, animal welfare, environmental and social inputs, contracts, processing and many other key areas. Given the complexity of the food system, in addition to technical issues associated with scalability, privacy, and data architecture, this can only be fully realized by ensuring that traceability is fully inter-operable (i.e. the different parts can talk to each other) and governance prevents a race for concentration of market power. De-centralization of traceability throughout the supply chain will improve incentives for safe, high quality, and socially and environmentally responsible food production and consumption.

The third D: Disseminate open data

Think of the impact of releasing the genetic sequence of coronavirus COVID-19. More than 150 possible vaccines are now being developed by the private and public sectors, some using traditional technologies and others unproven ones. Open data dissemination throughout the complex food system is also essential to correct information asymmetries, encouraging innovation, and increase the efficiency of public spending.

Kenya, for example, is starting to see a boom in applications that make use of open data promoted under the Kenya Open Data Initiative. With agriculture as a pillar of the economy and food security an over-riding concern, the government decided in 2011 to make core developmental, demographic, statistical and expenditure data available in a useful digital format for researchers, private companies, ICT developers and the public. The website opendata.go.ke supplies the public with some 942 datasets. Today, Kenya is leading Africa in the agricultural technology space, with the top-rated digital ecosystem and 30 percent of disruptive agricultural technologies in the continent. The impact of breakthrough technology such as the Global Positioning System developed by the U.S. Department of Defense to assist military forces and now distributed for free is another example of open data delivering significant positive impacts in everything from precision agriculture that allows farmers to put just the right amount of fertilizer in just the right place, to reviews which allow tourists and foodies to locate restaurants in a matter of minutes.

Open data also promises to enhance the efficiency of the public sector's support for the food system, at a time when more than a half trillion dollars are invested annually in countries tracked by the OECD. Open data enables sharing data between different public agencies, improving the performance of public processes and

Person using GPS-enabled sensor to track performance of machinery in rice paddy in Pakistan. Photo credit: Flore de Preneuf/World Bank

increasing efficiency of providing public services. In 2020, the EU28 is expected to save €1.7 billion in public administration costs thanks to the use of open data. Open data encourages innovative service delivery—NGOs and public agencies can use open data to develop new mobile applications to better serve the population. Data from farmers helps track the implementation of various measures such as sustainable production and land use plans. And consumer-reported data can help authorities identify food safety issues in close to real time.

Many existing policies, notably in Europe since 2003, prescribe that public sector data – or, data that are of a public-good nature - should be open and reusable. But several data-related risks may prevent digital technologies from fulfilling their promise: uncertainty about data protection, ownership, security, access, and control; questions of veracity, validation, and liability, and the imbalance in value chains. Public policy can improve data protection and clarify data ownership, address unfair data practices in agricultural policies, and reduce imbalances in the value chain and related information asymmetries. It can also promote the sharing of data by the private sector when data is of public interest, monitor and increase the impact of public data, and improve the governance of data sharing.

The coronavirus pandemic hit most countries in early 2020, at a time when the food system was already overdue for a major course correction to improve nutritional and environmental outcomes, and to quicken poverty reduction. By accelerating the move to digital technologies, physical lockdown measures could provide an unexpected tail wind and usher welcome change. This is a call for all hands-on deck now, to make sure the policy environment is conducive to digital solutions that bring us closer to achieving our Sustainable Development Goals by favoring de-concentration, decentralized traceability and dissemination of open data. If we succeed, we'll be able to leverage the creative energy, innovation and daily needs of the 7.7 billion farmers, businesspeople and consumers that make up the global food system in shifting course toward a more sustainable future.

World Bank Blogs

Digital technology ensures food supply in rural Bangladesh during COVID-19

By Iftikhar Mostafa

The COVID-19 pandemic impacted food supply chains in Bangladesh, especially in the informal and unorganized sector in rural areas.

Salma Akhter, a member of an agriculture cooperative in northern Bangladesh, has been extremely busy the past four months – since the COVID-19 pandemic hit, she has been volunteering to run a 'virtual call center' in her sub-district, helping connect rural farmers with suppliers and buyers. Farmer members call her on her mobile phone to place orders for seeds and fertilizer and to sell their produce including rice, vegetables, milk and fish.

Single-person rickshaw vans transport the aggregated goods, and payments are made through mobile transfers, substantially reducing the risk of transmitting the coronavirus.

This innovative solution is a great example of how rural farming communities can use technology to address challenges in times of crisis and beyond.

The COVID-19 pandemic in Bangladesh impacted food supply chains, especially in the informal and unorganized sector in rural areas. The lockdown impacted food accessibility, agriculture input supplies, jobs and farmer income. With disrupted local food supply chains and limited storage capacity, farmers became desperate to sell their produce, especially perishables.

Establishing Virtual Call Centers

This is where Producer Organizations (POs) stepped in. The POs were created as part of the Global Agriculture and Food Security Program's Missing Middle Initiative, supervised by the Food and Agriculture Organization (FAO).

The POs started 57 'Virtual Call Centers' (VCCs) in eight high-poverty districts to directly benefit farmer members. Embracing available technologies, the POs established an ecosystem linking farmers with input suppliers and off takers, while complying with physical distancing. The VCCs, each operated by a volunteer like Salma, use this database to facilitate purchase of agricultural inputs and services, and sale of produce.

The POs work closely with local authorities to ensure uninterrupted transport of produce during the shutdown. Transparent governance and simple accounting methods have been put in place. In addition to using mobile transfers like bKash, Rocket and Nagad to avoid paper currency transactions, the POs use Facebook and Messenger to share information and transaction records daily and Zoom to organize regular virtual meetings.

Open Foris Collect Mobile is used to gather transaction data, which is regularly posted on the MMI Bangladesh A2F+ project's website.

Salma Akhter runs a 'virtual call center', helping connect rural farmers with suppliers and buyers.

Improving livelihoods of farmers

As of first week of August, the virtual call centers have benefitted about 30,000 small-scale farmers of which 46 percent are women. VCC farmers have sold products worth more than Taka 34.4 million to buyers including private companies - PRAN, Rangpur Diary and Bombay Sweets; and purchased essential agriculture inputs worth Taka 5.9 million from suppliers. Participating farmers received on average higher prices when selling produce via VCC and post-harvest loss - especially of perishables - was significantly reduced.

Embracing different technologies – mobile phones, web-based messaging service, digital money, and online meeting platforms - combined with transparent governance, simple record-keeping and effective coordination, this approach has ensured that rural food supply chains in Bangladesh have operated effectively even in the midst of a global pandemic.

Single-person rickshaw vans transport the goods, and payments are made through mobile transfers.

What we can learn

Here are some key learnings we can gain from this initiative:

- **Availability of Technology:** Connectivity and affordability of mobile phones and internet services are crucial. The government's past initiatives to develop the ICT service sector and move the country toward 'Digital Bangladesh' has also helped facilitate the rapid implementation.
- **Ownership:** The virtual call center approach was designed and implemented by farmer members of the POs, which fostered ownership of the initiative.
- **Rapid Response:** The POs acted rapidly to establish the virtual eco-system by maintaining transparency, accountability and good governance. This helped build confidence among farmers, suppliers and buyers including private companies and facilitated implementation within a short period.
- **Rural Logistics:** In addition to digital technology, reliable rural logistics, like the rickshaw van for transporting agriculture produce, was instrumental.
- **Coordination:** Timely coordination between POs, suppliers, off takers, local authorities including law enforcement agencies enabled green channels to be established for safe and uninterrupted transport of produce.
- **Disintermediation:** This approach significantly reduced intermediaries in the rural food supply chain and directly connected farmers to consumers.

Partnerships among government, producer organizations, non-government organizations, and agriculture value chain actors can enable scaling-up of the VCC approach in other rural areas of the country. A good example of this is the World Bank-funded Livestock and Dairy Development Project that has adopted the VCC approach to support farmers through its emergency action plan.

With effective use of technology, these virtual call centers have proven that it is possible to both save lives and maintain livelihoods during the COVID-19 pandemic, and in the process, turn a crisis into an opportunity.

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Iftikhar Mostafa
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Dr. Iftikhar Mostafa is a Senior Agriculture Economist in the Agriculture and Food Practice Group, South Asia Region at the World Bank. He has more than 25 years of experience in food and agriculture, public-private partnership, finance, and strategy development and implementation. Dr. Mostafa has worked on agriculture, health, education and infrastructure in sub-Saharan Africa, South and South East Asia, Central Asia, and South America. Prior to his current role, he was Senior Agriculture Economist in the Global Agriculture and Food Security Program (GAFSP) Coordination Unit, and earlier was Advisor in the CGIAR Fund Office at the World Bank. He served as Co-chair of the Sustainable Food System working group of the United Nations Zero Hunger Challenge. He was Executive Manager of Corporate Strategy, Grains Research and Development Corporation (GRDC) in Australia, and held senior positions in the Australian Government Department of Finance and the Islamic Development Bank. As Assistant Professor of Economics and Finance, Dr. Mostafa taught

in the School of Business at Saint Bonaventure University, New York. He holds a Ph.D. in Economics from Cornell University. He is an alumnus of the International Institute for Management Development (IMD) in Switzerland, and a member of the Australian Institute of Company Directors.

World Bank Blogs

Sustainable Sustenance

Community-supported agriculture bridges the gap between growers and consumers, significantly reduces a farmer's carbon footprint and puts more dollars into their pockets

By Steven Crook

This year, BDFF has begun sending out food boxes on a subscription model. Photo courtesy of Buy Directly From Farmers

Community-supported agriculture (CSA) is a way urban households can obtain healthy produce, while helping to build a more sustainable farming sector in Taiwan.

King Hsin-i's transformation from advertising copywriter to social entrepreneur began in 2008, when she visited a rice farmer who practiced pesticide-free agriculture.

"He explained that we have to leave space for other species. At the same time, I realized that while big companies have budgets to spread their messages, farmers have few chances to tell the public about their beautiful concepts," she recalls.

Inspired, she quit her job and traveled throughout rural Taiwan for a year.

King went on to spend time with farmers in Colombia, Israel and Italy, to name a few of the countries she visited. However, the Facebook group she created in 2011 to connect Taiwan's eco-friendly farmers with consumers willing to buy from them generated uneven results. Some farmers benefited from this attempt to develop CSA, but many were too busy nurturing their crops to develop a social media following.

Recognizing the need for a more professional setup, King established Buy Directly From Farmers (BDFF) in 2014. BDFF's 150 farmer-partners — up from 100 last year — will during the course of this year offer over 280 different products. Her 10 full-time salaried employees work with agriculturalists of all ages, but put special effort into telling the public about what young farmers are doing.

"Young people are the future of agriculture," King says.

About half of the farmers BDFF cooperates with are certified as organic. Many others do not use synthetic pesticides, but think the organic certification process is too expensive.

BDFF earns commissions of 20 to 30 percent on sales of produce through its Chinese-only Web site, www.buydirectlyfromfarmers.tw. Businessmen who buy from farmers and sell on to supermarkets and food-processing companies take a cut of 40 percent or more, King says.

Several BDFF farmer-partners earn 90 percent of their income through BDFF, she adds. According to last year's BDFF Social Impact Report, more than 75 percent

of farmer-partners saw their incomes rise by at least 20 percent as a result of collaborating with the social enterprise.

Sweet potato farmers tend to their crop in Yunlin County. Photo courtesy of Buy Directly From Farmers

UNCONVENTIONAL MIDDLEMAN

Unlike a conventional middleman, King does not need to factor in the risk that food will spoil, as all fresh items are shipped by the farmers themselves. Dried items, including native quinoa, rice and tea, are dispatched from BDFF's warehouse in Taoyuan. BDFF bears all delivery expenses.

BDFF isn't the first or only CSA entity in Taiwan. Hualien-based Big Wang Vegetable Shop operates a slightly different model. Founder Wang Fu-yu originally planned to take up organic agriculture, but in 2008 he realized he could do more good by helping experienced organic farmers sell their crops.

Unlike other middlemen, Wang is willing to buy small quantities (as little as 3kg) of produce. Customers place orders via the shop's Chinese-only website, www.buylocal.tw. In recent years, the shop has expanded into downstream activities, buying wheat and soybeans from farmers so rural artisans can make bread, pasta and tofu, boosting incomes in areas where there are few economic opportunities.

So far, this year has been a banner year for BDFF. People afraid of contracting COVID-19 have been cooking at home instead of eating out, and paying greater attention to the quality of the ingredients they use.

Between February and April, King's team handled a record number of orders. "Free-range meat, sustainably sourced fish and rice were especially popular. We sold out of rice for the first time ever," King says. Despite the surge in demand, BDFF's farmer-partners didn't raise their prices.

Many consumers want to protect themselves and their families from pesticide residues. However, according to King, concern for the environment is the primary motive for over 60 percent of BDFF's customers.

LOW CARBON FOOTPRINT

Sustainability is also King's overriding principle. Growing, packaging and transporting food account for about a quarter of global greenhouse gas emissions. About two thirds of the calories consumed in Taiwan are imported, a lot being shipped across the Pacific. Supporting environmentally-sensitive local farmers can not only help preserve ecosystems, but also increase food security.

When reviewing applications from farmers who hope to sell through BDFF, King first considers their environmental approach.

"Then we ask: 'Do they grow something that our customers want?' We may turn them down if we already have a few partners already selling the same thing," she says.

Occasionally, BDFF seeks out certain types of farm in response to customer requests.

"Before 2018, we didn't sell any apples. In Taiwan's climate, growing apples without chemicals is virtually impossible, but we eventually found two farmers able to grow apples with minimal pesticides," King says.

A few agriculturalists have quit the platform after deciding that eco-friendly farming is more trouble than it's worth. King parted ways with one farmer who insisted on using nighttime lighting to speed the growth of his passion fruit.

BDFF conducts its own residue tests. For produce from non-organic farmers, the social enterprise's

Rice seedlings are prepared for transplantations in Miaoli County. Photo courtesy of Buy Directly From Farmers

standards are between four and 10 times stricter than those imposed by the government.

"The most popular products on our Web site are organic fruits, because they're not as easy to find in stores as organic vegetables," says King. For apples, jabuticaba, and abiu (which Taiwanese call huangjingguo), demand often exceeds supply.

In King's opinion, the Warrior Golden Diamond Pineapple has been one of the enterprise's greatest successes. Commercial pressures have forced many indigenous landowners to embrace intensive agriculture, but BDFF is helping a group of Bunun farmers in Taitung County swim against the tide.

"A school principal there contacted us, hoping we could work with some of his students' parents, to preserve their traditional sustainable farming methods. We told those farmers we could offer high prices for their pineapples, and we paid an instructor to teach them modern eco-friendly techniques," King says. "Their pineapples are now the best-selling of the five varieties we sell."

In 2020, BDFF launched a series of themed food boxes (priced NT$799 to NT$999) which it sends out to subscribers weekly or biweekly. In addition to five to seven different kinds of in-season produce, each box contains recipes. One type of box is for those who want to spend no more than 15 minutes preparing a meal; another encourages families to eat breakfast at home together; a third follows the precepts of traditional Chinese medicine in the way it combines foods that herbalists regard as "warming" or "cooling."

In Taiwan, as in many prosperous societies, a lot of food is thrown away before it reaches the consumer. King sees BDFF's food boxes as an opportunity to teach people how to reduce waste — recipes come with tips on the various uses of fruit peelings, for instance — and to sell items that might otherwise be discarded because of their size or appearance.

"Sweet potatoes that are too small to be sold in a supermarket, and cucumbers that aren't straight, go into our boxes," she says.

Some of BDFF's farmer-partners are installing Internet of Things (IoT) technology on their land so they can monitor their fields from afar.

"This also means our customers can be 'godparents' and watch online as the food they'll eat grows," King says.

King thinks IoT will greatly benefit the agricultural sector, and not just by helping farmers build deeper connections with those who buy their produce.

"Through it, they can instantly know the soil temperature, soil moisture and other variables without having to go to the field," King says. "This kind of data is essential, as experience counts for less when the climate is changing."

Taipei Times

Japanese scientists develop salt-resistant rice variety

KYODO

A Japan-based team of biological scientists has developed a new rice variety that is salt-resistant. | BLOOMBERG

A Japan-based team of biology scientists has developed a new rice variety through genetic improvement in an attempt to increase crop yields in a salty paddy field.

The team, led by the National Agriculture and Food Research Organization, has said it succeeded in finding a gene that determines the angle of root growth, hoping the discovery will lead to more new rice varieties amid the growing risk of salt damage as a result of frequent high tides and typhoons due to global warming.

Salt damage is predicted to affect about half the world's existing arable land by 2050, with coastal areas in Japan and some other countries, including Bangladesh and Vietnam, already facing challenges, according to the team.

"By using this gene it may be possible to design how rice roots grow to suit farmland conditions," said Yusaku Uga, a principal scientist at the organization.

The gene was found in one type of Indonesian rice, whose roots grow along the surface of the ground.

Just as in a drought, soil with high levels of salinity prevents plants from taking in water. Moreover, the soil becomes too firm, making them depleted of oxygen.

Presuming that rice would also be more resilient if its roots can grow along the surface of the soil, the team spent four years from 2015 monitoring how the Japanese rice Sasanishiki crossbred with the Indonesian variety produces grains in a salty paddy field, compared to ordinary Sasanishiki.

The scientists said the genetically improved rice saw a 15 percent increase in harvest in salty water. Meanwhile, it showed no difference in growth performance in a normal paddy field.

Shallower roots are also said to be advantageous for plants to take in phosphorus, an essential nutrient, suggesting the method could be beneficial for farmers in poverty-stricken countries and regions where fertilizers are not easily available, Uga said.

The 45-year-old scientist said the findings hold promise for other crops including corn and soybeans as they have similar genes that determine the angle of root growth.

"With further research and experiment, non-Japanese varieties resilient to salt damage could be developed, which will likely help farmers in different parts of the world who are threatened by natural disasters," he said.

Japan Times

Signs of farm 'revolution' in India as coronavirus prompts change

By Mayank Bhardwaj
Reuters

For more than two decades, Indian farmer Ravindra Kajal cultivated rice the way his forefathers had — every June he flooded his fields with water before hiring an army of farmhands to plant paddy seedlings.

But a scarcity of workers this year because of the coronavirus forced Kajal to change. He irrigated the field just enough to moisten the soil and leased a drilling machine to directly sow seeds on his 9-acre (3.6-hectare) plot.

"Since I was more than comfortable with the tried-and-tested way of growing rice, I opted for the new method with some trepidation," said Kajal, 46, looking over his field, green with rice saplings, in the Raipur Jattan village in Haryana state.

A farmhand inspects the ground as water is being pumped from a bore well to flood a rice field at a farm in Karnal district, Haryana, India, on June 26. A scarcity of workers this year because of the coronavirus is forcing Indian farmers to turn away from traditional methods of farming. | BLOOMBERG

"But I've already saved around 7,500 rupees ($100) per acre because I hardly spent on water and workers this year," he said.

India is the world's biggest exporter of rice and the world's second-biggest producer after China. Across the country's grain bowl states of Haryana and neighboring Punjab, thousands of farmers like Kajal have been forced by the coronavirus to mechanize planting.

They are still wary of the technology and overturning the time-honored use of manual labor.

But Kahan Singh Pannu, Punjab's agriculture secretary, is convinced a historic change is underway that could dramatically increase India's rice output, which in turn could impact world markets.

"It is no less than a revolution in Indian agriculture," he said.

Government officials say the so-called direct seeding of rice (DSR) method could increase yields by about one-third and slash costs on workers and water.

The DSR machines allow farmers to grow more than 30 saplings per square meter against the usual 15 to 18 seedlings, said Naresh Gulati, a state government farm official in Punjab.

Punjab is the home of the 1960s Green Revolution that led to a spike in crop yields. In 2020, farmers there have used seed drilling machines to sow rice on more than half a million hectares, a big increase compared with less than 50,000 hectares in 2019, growers and government officials said.

Pannu expects DSR use to jump again in 2021.

"More and more farmers are using the DSR technology which seems to be so promising that the entire 2.7 million hectares of Punjab's rice area could come under it next year, which will be a watershed for India's rice production," he said.

Avinash Kishore, a research fellow at the Washington-based International Food Policy Research Institute (IFPRI), said if this year's crop was good, DSR would be the way forward.

"The scale of this year's shift to the DSR is a momentous change in rice cultivation in India," he said.

Sudhanshu Singh, a senior agronomist at the International Rice Research Institute in the Philippines, said the shift to DSR was "one of the rare positive fallouts from COVID."

None of the world's major rice exporting nations — India, Vietnam and Thailand — makes significant use of seeding machines.

They have come into play in a big way in India this year because hundreds of thousands of migrant laborers from Bihar and Jharkhand states in the east did not arrive in the northern grain belt for the 2020 planting season due to the coronavirus lockdown.

That pushed up the price of local workers and made it more economical for farmers to lease rice planting machines rather than pay for hired help, said Jaskaran Singh Mahal, a director at the Punjab Agricultural University.

Farm wages have gone up by 1,500 rupees an acre to about 4,500 rupees this year, and growers need around half a dozen workers to transplant rice paddy on a one-acre plot.

In comparison, farmers can hire planting machines for 5,000 to 6,000 rupees per acre, which can cover 25 to 30 acres in a day, rice growers said.

"Other than helping us save on major overheads such as water and labor, DSR is swift, unlike the old method which was tedious and time-consuming," said Devinder Singh Gill, a farmer in Punjab's Moga district, well known for its aromatic basmati rice.

The conventional method requires farmers to sow seeds in nurseries and then wait for 20 to 30 days before manually transplanting the seedlings into plantation fields that are ankle-deep in water.

Seeding machines allow farmers to bypass the nursery stage and plant straight into fields.

Water conservation is another key attribute of DSR, which is crucial in a mostly dry, monsoon dependent country like India.

Under the conventional method, 3,000 to 5,000 liters of water is used in India to produce 1 kg of rice — the most water-thirsty crop — and DSR allows growers to cut water use by at least 50 percent to 60 percent, farmers and government officials said.

The main challenge for farmers using direct seeding machines is managing weeds, which require the spraying of herbicides through the season.

Still, even factoring in the extra costs of these applications, the overall cost of cultivation is substantially lower under DSR, said Kajal, the farmer in Haryana.

Another drawback will be that if the method is adopted across the farm belt, there will be huge unemployment in the eastern states next year.

But farmers say they will wait to see the harvest in October before deciding whether to stick with the technology next year.

"The new technology leads to a lot of saving on account of water and labor, but the real test lies in productivity and farmers will not be fully convinced unless they see some rise in their yields," said Ashok Singh, a rice farmer.

Japan Times

Silver lining in the health crisis? Less food waste

By Thin Lei Win
Thomson Reuters Foundation

When the coronavirus pandemic forced Rohini Singh to work from her house, she realized the grocery bill was likely to rise since her family of three would be mostly eating at home.

She also didn't want to waste food, with shelves in some supermarkets emptying in the early days of the crisis, and trips to stock up becoming more perilous.

"I think the pandemic made me more conscious about saving money and not wasting (food) if I can help it," the university professor, who lives in Ohio, told the Thomson Reuters Foundation.

To try to achieve both goals, she signed up to Imperfect Foods, which delivers produce and other foods rejected by grocery stores and supermarkets for cosmetic reasons.

"Instead of getting thrown out, if (the foods) were to be sent to consumers who don't mind the bumps and blemishes, it seemed... a way to cut down on waste," Singh said.

Advocates against food waste say the pandemic has made some consumers in rich countries reconsider how much food they bin, a habit they hope will stick even after the health crisis is over.

Rachael Jackson, who runs Eat or Toss - a website that helps people assess if foods such as apples with black spots or sweet potatoes with purple sprouts are still safe to eat - said her traffic tripled between February and May.

"People didn't want to go out as much, and things they found in their kitchen that normally they would throw away… now they were interested in doing research to find out if it was still okay to eat," the Washington-based journalist said.

Since then, the site's traffic has neatly followed the U.S. pandemic's curve, slipping a little when shops and restaurants re-opened and climbing again since July as the virus resurged, Johnson said.

Dana Gunders, executive director of ReFED, a non-profit focused on reducing food waste in the United States, is optimistic pandemic-sparked behavior changes - such as eating more leftovers and being careful about waste - will last.

"Certainly in the United States this pandemic is stretching out long enough that it is building new habits," she said.

People are likely to continue to eat more at home for the foreseeable future and do more food shopping online, which tends to result in less waste, she said.

Before the pandemic, almost a third of the food that makes it to the market was wasted at shops and homes, according to the U.S. Department of Agriculture.

Studies in parts of Europe show food waste declining.

A survey of nearly 7,000 people in Belgium, Italy, Portugal and Spain, published Tuesday by Euroconsumers, a cluster of consumer organizations, found the number of people who said they threw away almost no food doubled to 70% during lockdown.

WRAP, a British non-profit focusing on sustainability issues, similarly found in an April survey that households were wasting a third less of four key products - potatoes, bread, chicken and milk - than before the virus lockdown.

Waste figured inched slightly higher in a repeat survey in June, as lockdown eased.

Still, the 18% of food purchased that was thrown away in June was lower than the pre-lockdown level of 24%, said Andrew Parry, special advisor for food and drink at WRAP.

"It's a positive unintended consequence" of the pandemic, he said. "There's been an increase in the realization food is precious."

Climate change concerns are playing an important role too, with more than 80% of people surveyed in June citing this as a worry. However, only 37% said they

understand the link between food waste and global warming, Parry said.

With rising food production a major driver of deforestation and a big consumer of fossil fuels for farming, processing and delivery, cutting food waste can significantly cut climate changing emissions, scientists say.

Globally, a third of all food produced - about 1.3 billion tonnes - is lost or wasted along the whole supply chain, according to a 2011 assessment by the United Nations' Food and Agriculture Organization (FAO).

The U.N. Environment Program is expected to put out updated figures on food waste in shops and homes in 2021.

Overall, food production accounts for about a quarter of climate changing emissions, according to a 2018 report in the journal Science.

SMALLER MENUS

The pandemic has made restaurants more open to tackling food waste to cut costs, said Renata Bade Barajas, CEO and co-founder of Iceland-based start-up GreenBytes, which uses artificial intelligence to predict sales and optimal stock levels.

"Now more than ever, they have to optimize their whole system and cut down unnecessary operational costs," she said.

Their initial research showed many restaurants in Reykjavik could be throwing away hundreds of kilos of food a month, said Bade Barajas, whose work in the kitchens of restaurants and juice bars during her university studies brought her face-to-face with food waste.

"Every day, without fail, you end up throwing away so much food," she said. "I felt guilty."

ReFED's Gunders said she sees "fundamental changes" in restaurants and food services that could lead to less waste in the long run, such as ending self-service buffets.

Many restaurants have also re-opened with smaller menus because of the unpredictability of footfall, a trend that could outlast the pandemic and cut waste, she said.

Other food businesses are getting into the act too.

Last week (late September), some of the world's largest food retailers and providers including Carrefour, Walmart, Tesco and IKEA Food said nearly 200 of their major suppliers have committed to halving food waste by 2030.

Tesco in Britain has also partnered with food sharing app OLIO, which allows users to see food items nearing their expiry date in their area and collect them for free.

Jackson, who runs Eat or Toss, said cutting food waste is a way for households to have a real impact on climate change.

"We can feel helpless about addressing climate change because it seems really big. But if you're keeping an eye on what you're wasting, and consciously cutting that down, you can actually have a significant impact," she said.

Japan Today

Golden harvest at risk: Climate change puts heat on rice yields

By Ko Dong-hwan

Rice from a paddy in the Jookdong-dong area of Busan's Gangseo District is harvested. Korea Times file

'Super rice' development urged

Various Korean rice types were tested in 2010 to see how they would grow in higher temperatures brought about by climate change.

The testing was based on general circulation model (GCM) scenarios and virtual models called crop environment resource synthesis (CERES). It was conducted by agro-climate change and ecology researchers from the state-run National Institute of Agricultural Sciences.

The results were startling. Compared to Korea's average temperature between 1971 and 2000, a test scenario with a rise of 2 degrees Celsius showed rice

yields would fall by 4.5 percent. The figure was 8.2 percent with a 3 degree rise.

When the test used the United Kingdom Meteorological Office's carbon dioxide-based scenario — known to forecast higher temperatures than other virtual climate models — the yield fall was 15 percent.

One of the Intergovernmental Panel on Climate Change's future climate trajectories, which incorporated intensifying greenhouse gas concentrations worldwide, also showed that Korea's rice production would sustain a huge hit, according to the Gyeonggi Province Agricultural Research and Extension Services.

Under a Representative Concentration Pathway (RCP) 8.5 — a scenario in which greenhouse gas emissions continue to rise throughout the 21st century — yields were expected to drop by almost 14 percent by 2040 compared to 2020.

"If the temperature keeps surging and we don't come up with any measures, we could see our rice yields fall by as much as 40.1 percent at the end of this century," Kim Joon-hwan, from the National Institute of Crop Science's (NICS) Crop Production and Physiology Division, told The Korea Times.

The forecasts are frightening in a country where rice has been a food staple for centuries.

In fact, Korea is experiencing a greater rise in average temperatures than many other countries. According to Choi Byung-yeol from the Gyeonggi agricultural services' Crop Research Division, Korea saw a 1.5 degree Celsius rise in average temperature in the 100 years from 1912, whereas the global average was 0.7 degrees.

The country's food self-sufficiency in 2018 stood at just 21 percent — down from 94 percent in 1965 — according to the Ministry of Agriculture, Food and Rural Affairs. This means that Korea relies heavily on other countries and could suffer a huge impact if there are hiccups in the global food supply chain.

In this August 2018 photo, a rice paddy in Hampyeong village in South Jeolla Province's Hampyeong County is arid after groundwater evaporated in an extreme heat wave. Yonhap

"The COVID-19 global pandemic has brought fears of a global food crisis," Choi told The Korea Times. "The United Nations World Food Programme has forecast that the global population in food poverty will jump from 130 million to 260 million by the end of 2020.

"We have also seen news that major agro-exporters such as Vietnam, Russia, Serbia, Pakistan, Cambodia and Thailand have started limiting exports to protect their own food security. This so-called food nationalism lockdown is becoming real. But what poses a greater threat is not something instantaneous like COVID-19. It is agro-environmental changes due to climate change's impacts that have been happening for much longer."

Rising heat

The country's agro-experts have been monitoring rising temperatures in Korea because of their effect on rice growth, yield and quality.

Evaluators taste a new rice type, Chamdream, at Gyeonggi Province Agricultural Research and Extension Services in Hwaseong in November 2019. It was developed by the agency and has improved flavor and a high tolerance of insects. Yonhap

In Suwon, in Korea's central Gyeonggi Province, average temperatures during the rice growing period from May to October rose by 1.5 degrees Celsius between 1964 and 2018. During 2000-2019, the figure rose by 1.1 degrees. Choi said temperatures throughout Gyeonggi had risen by 0.3 degrees every decade since 1970, but recently the trend has accelerated.

While climate change's two most defining effects are elevated atmospheric carbon dioxide and temperature, it is the latter that seriously affects rice production.

During rice's heading stage — when panicles are fully visible — when the temperature is 35 degrees or higher, it affects pollen and makes pollination unlikely to succeed, according to Jung Jong-tae from the Chungcheongnam-do Agricultural Research and Extension Services. He told The Korea Times that extreme heat had increased the unsuccessful pollination rate in 2018.

"For Japonica rice in Korea, the right temperature for the 40 days of the ripening period following its heading stage is 21 to 22 degrees Celsius," Jung said. "But if higher temperatures persist during that period, alpha-amylase, an enzyme in rice, becomes more active and dissipates starch inside the grains. It affects rice quality and yield as more grains become smaller and opaque in color, the grains' protein level increases and

fewer grains become available for polishing."

According to Ahn Gyu-nam from the South Jeolla Agricultural Research and Extension Services, rising temperatures affect rice ripening. Higher temperatures, especially during the 20 days following the heading stage, severely damage yields.

"Rising temperatures shorten the grain's growth period, especially for those that take longer than other types to ripen," Ahn told The Korea Times. "Although we alternated timings for seeding to accommodate climate change's impact, it eventually shortens the growth period before heading."

Citing NICS research from 2018 that forecast climate conditions for Jeonju, North Jeolla Province, during 2051-60 based on the RCP 8.5 scenario, Ahn said increased temperatures "sped up the grains' growth rate and reduced the time taken for the grains to reach the heading stage by five days." This ultimately "decreased the proportion of ripened grains significantly whereas unripe grains greatly increased."

'Super rice'

It takes 15 to 20 years to develop and introduce a new genetically improved rice type to weather harsher climate conditions. Korea has seen some new types developed that have proven stronger than their predecessors.

But doubts remain whether these improved types will keep up with future climate conditions, prompting experts to urge faster research and development for a "super rice" before it is too late.

"Despite climate change's effects in Korea, our rice production has so far been on the rise because of our new rice types," Joo Ok-jung from Gyeonggi agricultural services told The Korea Times. The agency found that Samgwang, a rice type developed during the 2000s, yielded more than those from the 1990s, and even more than earlier types.

To meet harsh climate conditions expected in the future, Korean rice experts began searching for strong local types and studied their genes to develop new "super rice." GETTYIMAGESBANK

Joo planted Chucheong (a rice type developed before 2000) and Samgwang — two major types grown in Gyeonggi — in a 1,000 square meter plot and compared their yields from 2009 until 2019. The average annual yield for Samgwang was 574 kilograms, while that of Chucheong was 519, meaning the former had better adaptability to rising temperatures.

"Better rice types are born after their strength is proven in a number of encounters with high temperatures, typhoons, blight and harmful insects," Joo said. "So the more recently developed types are equipped with a stronger natural resistance."

A rice paddy in North Gyeongsang Province was flooded in September this year after a series of typhoons hit the country. Courtesy of Gyeongsangbuk-do Provincial Government

Gyeonggi agricultural services has begun developing rice types that pollinate and ripen well in high temperatures and can withstand diseases like bakanea. This makes the infected seeds grow at least 1.5 times bigger than normal and they die within the first two weeks.

"One of the new rice types we are working on will withstand the tropical climate Korea might experience in future, so we are researching genes that allow grains to ripen at high temperatures," Joo said. "Our other upcoming new breeds have been designed to withstand a shortage of water and fertilizers, so as to be more effective for a future climate than the present one."

Other super breeds have been created by Chungcheongnam-do agricultural services. Bbareumi buds and ripens before summer's extreme heat arrives in Korea in June. Baekokhyang, in contrast, starts to grow after late August when summer is almost over. Sebi, another super rice developed by a Sejong University professor's team, has genes that allow pollination at 40 degrees Celsius, according to Jung.

"Future rice types must pollinate well under extreme heat, and not trigger alpha-amylase to keep the grains healthy and transparent, and have low protein levels," Jung said. "Each of these traits means a defense against climate change's various impacts like extreme heat, drought and flooding."

Korean researchers' hunt for stronger rice types dates back more than a decade. Seoul National University's Department of Plant Science tested Hwaseong and Dasan in 2008 and 2009, respectively, and found the former superior. They saw that Hwaseong

Chungcheongnam-do Agricultural Research and Extension Services demonstrates Bbareumi's fast growth in July by transplanting seedlings on one side of a paddy and harvesting them from the other. The banner in the background reads Bbareumi is "Korea's first rice type that can be harvested twice a year, in July and October." Yonhap

had a significant number of grains failing to ripen and a loss in yield when the temperature was raised by 5 degrees Celsius, whereas Dasan showed such signs between 1.5 and 3 degrees.

"Nurturing rice types that are not sensitive to high temperatures or developing new ones with such traits will reduce the risk of yield loss due to climate change," the school researchers concluded.

Kim said NICS has also recently found that Jowun, Manan, Dongan and Ilmi are particularly strong Korean rice types — with little change in quality or yield — in high temperatures.

"We have been paying more attention to high temperature's detrimental effect of reducing rice yields because of grains' shortened growth period and increased respiration volume than CO2's positive effect of increasing the grains' photosynthesis volume and thereby increasing its yield," Kim said.

But "super rice" cannot be a silver bullet by itself. Agricultural methods specialized to help rice grow under extreme conditions are also required for future production.

Planting rice later than the conventional season of spring to see its budding past summer's extreme heat is one way, according to Joo. This method is possible as spring and fall in Korea become shorter and summer comes earlier. Chungcheongnam-do agricultural services found that under temperatures of 26 degrees Celsius or higher for 20 days following the heading stage, irrigation with flowing water increased yields up to 14 percent compared to stagnant water.

The experts also recommended against using nitrous fertilization. Joo said the chemical hampers budding at high temperatures and lowers resistance to harmful insects.

Restricting arsenic in any form of fertilization is another key. Unlike the United States and China, where arsenic levels have often been high, in Korea, the chemical in over 1,100 rice samples was found at an average of 0.06 milligrams per kilogram, below the country's standard of 0.2, according to the Ministry of Food and Drug Safety's 2015 finding.

Arsenic and extreme heat were found to cause double the threat to rice production, according to a Stanford University Earth System Science Department 2019 study.

"Korean rice so far seems safe from arsenic," Jung said. "But if Stanford's study is true, the chemical in high temperatures could pose a new threat."

The Korea Times

Georgia extends business, agriculture support programmes

Starting with the 2020 autumn grape harvest, companies which collect grapes will be able to benefit from preferential agro-credit. Photo: National Wine Agency of Georgia.

The Ministry of Agriculture has extended support programmes for business and agriculture, and offers grapes, hazelnuts and tea producers an effective support package, said Georgian Prime Minister Giorgi Gakharia earlier on July 2, 2020.

Starting with the 2020 autumn grape harvest, companies which collect grapes will be able to benefit from preferential agro-credit.

Also, beneficiaries will no longer be obliged to produce a defined amount of grapes in case they receive credit for producing wine and alcoholic beverages.

The limit of the preferential agro-credit for 'funding the food industry' has increased from 5 mln GEL ($1.64 mln/€1.45 mln) to 10 mln GEL ($3.27 mln/€2.92 mln).

Moreover, agro leasing for the food industry has increased from 5 million GEL to 10 million GEL. Also, the interest rate of the leasing will be co-financed for 36 months instead of 24.

In addition, hazelnut and tea growers will have more support in receiving co-financed loans to promote hazelnuts and tea productions in the country.

Some changes will be implemented in the state programme 'plant the future' based on which setting up anti-hail and irrigation systems will be co-financed. The financial assistance will be provided for the establishment of new nursery farms and / or modernization / expansion of the existing nursery farms.

Back in May, the government presented its agricultural anti-crisis plan involving support for farmers through various state programmes amid the coronavirus crisis.

Then, Prime Minister Giorgi Gakharia said that Georgia needs to industrialise the agricultural sector and increase productivity.

Agenda.ge

A Turkish startup: save food, save money, save the Earth

By Melis Alemdar

A brand new startup brings together food vendors and customers by offering large discounts on surplus food, preventing food loss and aiming for a profit at the same time.

A UN study published in 2011 warns that "roughly one-third of food produced for human consumption is lost or wasted globally, which amounts to about 1.3 billion tons per year."

A start-up company in Turkey aims to change that - at least for residents of Istanbul for now. It is called Oreka and it is a young business, having launched in September 2020. The company is currently going through a growth process, say its co-founders Daniel Alp Rizo and Ethem Ozcan.

Oreka bridges the gap as a mid-partner between premium food producers and sellers. In essence, when markets, cafes,and patisseries have surplus product at the end of the day, Oreka are able to discount the goods by 50 percent, or more, sometimes, and offer them to be purchased by users of their app. Once they have done this, the buyer can go directly to the vendor, a cafe, for example, in person to collect the goods.

"Oreka helps food sellers monetise unsold food and gain new customers, while aiding customers buy premium goods at a discount," Rizo says. "Not to mention there is the environmental impact: there is less loss of food at the end of the day."

The partners attended a Sustainable Food Summit in Istanbul in 2019 and the idea for the Oreka app was born.

While the app focuses on sustainability and green economy, it does aim to make money by taking a small commission from vendors.

"According to the Economist magazine's Food Sustainability Index," Rizo tells TRT World, "among 82 countries Turkey ranked 80th – third from the bottom – in Food Loss and Waste."

"Based on 2018 data, Turkey's food loss and waste adds up to 214 billion lira [$34 billion]," Ozcan adds.

The co-founders say, theoretically, anyone could be an Oreka customer, but that their demographic is likely to be a young, smartphone-using one, and people generally concerned about the environment.

When asked about whether refugees could use the app, they are somewhat more cautious. "The vendors we have done deals with so far have been premium locations and require bank or credit cards," Rizo says.

There are, to date, 450 users, but it is good news for an app that only launched weeks ago and that already boasts 14 existing deals with vendors, companies such as

Oreka co-founders Ethem Ozcan (L) and Daniel Alp Rizo. (Courtesy of Oreka)

Pokemate, Brod, Spada Coffee, Socrates Bistro and Backhaus. Ozcan says they have already brokered deals with another 75 vendors that are not yet on the app, but their focus is on expanding in a controlled manner.

Currently, this intelligent, Earth-friendly app serves the neighbourhoods of Sisli, Beyoglu and Besiktas. "We are growing fast," Ozcan notes, "and we ultimately want to be available beyond Istanbul, throughout Turkey, and have plans to expand overseas as well."

TRT World

UN's FAO strengthens partnership with leading civil society organization in Asia-Pacific to achieve food security, improved livelihoods and sustainable transformation of agriculture

Food and Agriculture Organization of the United Nations

The Food and Agriculture Organization of the United Nations (FAO) on September 23, 2020 formalized its partnership with one of Asia's leading civil society organizations working to achieve the Sustainable Development Goals (SDGs) to end hunger, achieve food security, improve nutrition and promote transformative, sustainable agriculture.

The CSO, Asian Partnership for the Development of Human Resources in Rural Asia (AsiaDHRRA), is a regional leader in building partnerships to empower farmers. It has been active since the 1970s and has been advising and collaborating with FAO in the Asia-Pacific region for more than a decade.

AsiaDHRRA has been instrumental in global, regional and national inter-governmental policy-making, consultations and decision-making processes. It has engaged with Governing Bodies facilitated by FAO, including the Committee on World Food Security (CFS) and the biennial FAO Regional Conferences for Asia and the Pacific (APRC).

That relationship with FAO was formalized today following the virtual signing of a Memorandum of Understanding (MoU) between AsiaDHRRA, based in the Philippines and FAO's Regional Office for Asia and the Pacific, based in Bangkok, Thailand, to strengthen its partnership work.

"The collaboration of AsiaDHRRA and FAO through the years has been very good, and this more formal arrangement will allow us to work together in closer partnership to accelerate our joint efforts to improve the livelihoods and food security of farmers and rural people," said Jong-Jin Kim, Assistant Director-General and FAO Regional Representative for Asia and the Pacific. "FAO is committed to working with a wider range of development partners, including CSOs and the private sector, in general, and most particularly during this exceptional point in history as the region and the world moves to recover from the effects of COVID-19."

AsiaDHRRA and FAO, among other activities, will work to raise awareness about the UN Decade of Family Farming and the MoU will help to facilitate the establishment of partnerships and collaborations at national level to promote family farming. It will play an important role in identifying ways to enhance the voice, representation and participation of rural organizations (including farmer's organizations) as key stakeholders in policy dialogue and policy consultation processes.

"AsiaDHRRA hopes to be able to contribute in more programmatic way in strengthening social structures that will respond to the calls of the poor and vulnerable, especially amidst the pandemic," said Nguyen Xuan Hong,

Chairperson of AsiaDHRRA. "We hope to join hands with FAO in its efforts to lead the recovery in the region, with the confidence that we have as grounded rural development organizations and agri-agencies, with the instinct and experience for decisive action, brought by decades of work within and across the region, and connected to global partnerships, in solidarity."

FAO and AsiaDHRRA are already working together to provide technical advice and mentoring to rural organizations on agribusiness and financial management, with emphasis on gender, youth and environment and climate change issues.

FAO will also be collaborating with AsiaDHRRA to contribute to developing ASEAN's Rural Development and Poverty Eradication (RDPE) Masterplan 2020-2025, which provides a cohesive guiding framework for ASEAN's rural development and poverty eradication strategies.

The Food and Agriculture Organization of the United Nations (FAO) Press Release

The Philippines recognized in food visioning competition

By Conrad M. Cariño

The Philippines has received "special recognition" from the prestigious, Rockefeller-funded Food System Vision Prize for its entry that envisions to reduce the country's food imports worth billions of dollars by 2050.

The Philippine team, led by the National Academy of Science and Technology (NAST), submitted its entry "Feeding Metro Manila in 2050" that aims to wean Filipinos from a rice-based diet. In place of rice, consumption of other staples like banana, sweet potato and other root crops and tubers are pushed.

Food will also be sourced from more affluent farmers who directly deliver to consumers more nutritious food through a digital-based distribution system. Also, the future food system will transform waste into economically valuable resources, such as fertilizers or renewable energy.

"The traditional sewage treatment plant will be transformed [into] a 'factory' where domestic waste will be processed to produce recycled water, energy and fertilizers. Consumers will earn from the daily waste they generate," Eufemio Rasco of NAST said in the entry.

Food will also be produced with less water, and more land will be transformed into watersheds, forests and habitat for a richer biodiversity.

Among the visions of the entry is the extensive use of Fourth Industrial Revolution technologies for agriculture, like soil-less farming and smart sensors.

The competition is being pushed by the New York-headquartered Rockefeller Foundation, OpenIDEO and SecondMuse. Its goal is to help economies develop a vision for sustainable and nourishing diet for their people. It has established a $2-million fund for the prizes.

Government collaborators in the Philippines' entry include the Institute of Plant Breeding of the University of the Philippines (UP) Los Baños and Philippine Rice Research Institute. From the academe, the participants were De La Salle Araneta University,

De La Salle University-Manila, Ateneo de Manila University and UP (SPICE project).

The private sector was represented by East West Seeds, Philippine Chamber of Agriculture and Food Inc., and Management Association of the Philippines-Agribusiness, and Countryside Development Foundation. Research associations and other civic groups include Coalition for Agricultural Modernization of the Philippines, National Research Council of the Philippines, Urban Agriculture PH, Pambansang Kilusan ng Mga Samahang Magsasaka and Young Professionals for Agricultural Development.

The Manila Times

Sri Lanka observes first-ever 'International Day of Awareness of Food Loss and Waste'

On 29 September 2020, we observe the world's first annual 'International Day of Awareness of Food Loss and Waste'. This day highlights the importance of minimising food waste and presents a call to action to everyone along supply chains right down to the consumers.

During this time, when Sri Lanka's efforts to counteract bio-waste pollution and landfilling are being emphasised, in the year 2018/19, 50-60% of the total solid waste transported in the Western Province, to the three dumping sites in Kaduwela, Karadiyana and Kerawalapitiya by 20 local authorities, was food waste.

The Food and Agriculture Organisation of the United Nations (FAO) highlights that prevention of food waste is key because it preserves food at the highest socio-economic and environmental value for producers, processors, distributors, and households. Prevention and reduction of food waste, from wholesale to households, can support food access for all, especially those most vulnerable in the face of food insecurity and climate change.

State and Private Sector collaborations and partnerships are vital for successful food waste prevention and reduction actions through investments in infrastructure, better food packaging and portioning, and enhanced knowledge on the impact of one's food choices on health, the environment, and the economy. By cutting back on food waste, we save money on food not purchased to be thrown out by consumers, labour and resources such as water and energy to be consumed in vain by producers and plastic packaging to be landfilled by retailers, to name a few. To achieve this, we all need to adopt the mind-set and behavioural changes and follow up with concrete action.

The Ministry of Urban Development and Housing, supported by FAO and the International Water Management Institute (IWMI), has launched a project on 'innovative approaches to reduce, recycle and reuse food waste in urban areas' aiming towards:

- Raising awareness on the impact of and solutions for food waste. Enabling stakeholders' consultations through face-to-face or digital meetings;
- Collaboration and co-ordination of stakeholders for food waste data collection in 10 urban areas and estimates of its socio-economic and environmental impacts. A multidisciplinary team, including academia, are conducting in-depth research to identify knowledge gaps and innovative solutions;
- Drafting an evidence-based Urban Strategy and Roadmap on Food Waste Prevention, Reduction, and Management in Sri Lanka, for which consultations with the public sector, the private sector, and civil society are being held.

The food crisis triggered by the COVID-19 pandemic highlights the fragility of our food systems.

We can all make a difference. Act now on food waste prevention and reduction!

Reducing food waste can bring about benefits to society as a whole and can result in:

- increased food availability to the most vulnerable
- a reduction in the emissions of Green House Gases (GHG)
- reduced pressure on land and water resources
- increased productivity and economic growth

As a run up to the 2020 'International Day of Awareness of Food Loss and Waste', the Ministry of Urban Development and Housing, together with the FAO and IWMI, conducted three digital consultations on food waste prevention and reduction for universities, food services, and retailers/supermarkets. One more digital workshop is planned for schools in October 2020.

Daily FT

Promoting Iranian saffron in global markets a major plan of TPO

By Mahnaz Abdi

Given the importance of saffron as one of the country's major export items, the promotion of Iranian saffron status in the global market is one of the main issues followed up by Iran's Trade Promotion Organization (TPO).

In this regard, the organization constantly holds different meetings attended by the representatives of related organizations on this issue, as it considers the expansion of the export markets of Iranian saffron a necessity.

The latest meeting held by the TPO was the meeting of the National Saffron Export Desk on September 16, 2020.

According to Mahmoud Bazari, the director-general of TPO's Export Coordination Office for agro crops and processing industry products, the mentioned meeting was aimed at investigating the ways for the promotion of saffron exports and releasing the reports on the subject by related organizations including Iran Chamber of Commerce, Industries, Mines and Agriculture (ICCIMA), Iran Chamber of Cooperatives (ICC), and National Saffron Council.

During the meeting, TPO Head Hamid Zadboum stressed the significance of boosting Iranian saffron exports and elevating the status of this strategic product in the global markets.

He further underlined the role of producers and exporters of saffron in this due, and released a report on the organization's supportive measures and offered incentives since the Iranian calendar year 1381 (March 2002-March 2003) for promoting the status of Iranian saffron in the global markets and removing the barriers in the way of exports.

TPO has recently set up a special task force on the trade of saffron.

Underlining the significance of saffron in Iran's exports, Zadboum has said that his organization has had supporting the exports of this product through offering different incentives a top agenda of its activities since the Iranian calendar year 1380 (March 2001- March 2002).

The special task force held its meeting at the place of TPO in the presence of the representatives of Agriculture Ministry, Institute of Standards and Industrial Research of Iran (ISIRI), Vice Presidency

for Science and Technology, Ministry of Finance and Economic Affairs, Health Ministry, Export Development Bank of Iran (EDBI), Iran Chamber of Commerce, Industries, Mines and Agriculture, Iran Chamber of Cooperatives, National Saffron Council, and the Organization for Protection of Consumers and Producers (OPCP).

About 85 percent to 90 percent of Iran's saffron is produced in the northeastern provinces of North Khorasan and Khorasan Razavi and the eastern province of South Khorasan.

Based on the data released by Iranian Vice Presidency for Science and Technology, Iran earns some $500 million annually by exporting medicinal herbs, of which about $350 million is related to saffron and the rest is the share of other medicinal herbs.

Tehran Times

Royal farming model off to running start

Suttipong Juljarern sheds some light on 'Khok Nong Na'

People grow rice in tambon Klong Ton Pho of Ban Pho district in Chachoengsao. (Photo by Nutthawat Wicheanbut)

The Khok Nong Na model is a new agricultural concept based on the New Theory Agriculture and the Sufficiency Economy philosophy initiated by His Majesty King Bhumibol Adulyadej The Great.

Suttipong Juljarern, director-general of the Community Development Department, spoke to the Bangkok Post to explain what it's all about.

Financed by the department's 2019 budget, Khok Nong Na has the ultimate goal of creating a good life with agricultural best practices championed by King Rama IX and further developed by His Majesty King Maha Vajiralongkorn Phra Vajiraklaochaoyuhua.

In essence, the Khok Nong Na model refers to the application of indigenous farming wisdom to produce a modern-day farming method intended for the kingdom's new generation of farmers.

The model divides land into four parts: 30% for irrigation water storage, 30% for growing rice, 30% for growing a mixture of plants and the remaining 10% reserved for residential and livestock areas.

According to Mr Suttipong, the Khok Nong Na model sets a goal of planting at least 10 million perennial trees in farms that adopt the concept. The trees do not have to be a cash crop and can even be used as a guarantee when the farm owner applies for a loan with the government.

The model is still being piloted in Phitsanulok, Sukhothai and Kamphaeng Phet provinces.

"We are trying to encourage large farms to adopt the Khok Nong Na model," Mr Suttipong said. "We will help them process their produce and sell it. By joining the [Khok Nong Na] project, farms, large or small, they can collaborate so they can sell their produce at better prices. In the future, large farms can be turned into a shelter in times of natural disasters.

"For small farms of 1-3 rai, we want to turn them into a source of local wisdom. We give them five years to develop themselves as a learning centre to give advice to people in their communities, teaching them about how to do agriculture in line with the Sufficiency Economy concept and the New Theory.

"The Khok Nong Na project has many underlying objectives. We hope that it could serve community tourism by offering services to tourists who come to enjoy nature while learning about agricultural practices championed by the project."

Once the project expands nationwide, the director-general said the department would allow farmers and even temples to run it by themselves

without financial assistance from the department. However, the department would continue its technical support for Khok Nong Na farms such as the use of Big Data and satellite technology.

"We have a dream to establish a university that teaches a degree in the New Theory Agriculture and other agricultural concepts developed by King Rama IX. The university will be likely located in Nakhon Nayok due to the province's problem of acidic soil," he said, saying he considered this problem a challenge for the Khok Nong Na project.

Tentatively named "The University of the King's Philosophy", over 4,000 royally-initiated projects, 40 agricultural concepts and the Khok Nong Na model will be taught at the university.

"We want to set up a centre that compiles knowledge and provides education to develop the quality of life comprehensively," he said.

"The university will have campuses nationwide with facilities similar to learning centres of the Khok Nong Na project for students of the university to intern in.

"With the Khok Nong Na model, we believe that everyone in society will be happy and the country will prosper."

The director-general urged people who are interested to learn the farming model to contact the provincial community development in each province or send him a letter or a direct message on his Facebook page.

"The Khok Nong Na model attests to the monarchy's generosity to share his agricultural concepts and theories based on the principle of self-reliance," he said.

The director-general reiterated that the Khok Nong Na model could solve almost all problems related to agriculture in Thailand such as drought and flooding.

"The Khok Nong Na model is friendly to the environment and respectful to nature," he said. "Farmers who adopt this model will definitely rely on themselves with produce they grow themselves at the farm."

Mr Suttipong said, however, that everything takes time, adding the project might not turn out to be as successful as hoped in the first year of its implementation.

Apart from helping to conserve the environment and improve people's quality of life, the director-general said he believed the project could unite people.

"What King Rama IX gave us and HM the King's determination to further develop the late King's work will benefit humanity, not just Thai people," he said.

"I believe that we will not live in poverty and will live a happy life if we follow the Sufficiency Economy concept."

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