

# The Bulletin

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*Welcome to The Bulletin, our quarterly newsletter covering U Bank's innovation and research work.*

With this newsletter U Bank not only seeks to highlight its own work but also deep-dive into global and local financial sector trends and developments. It is meant to be an exploration of the various sectors and topics that intersect with banking, microfinance, financial inclusion and sustainable development in an effort to encourage dialogue on the key challenges and opportunities; while working on pushing forward the frontier when it comes to ensuring financial access & coverage.

Our latest issue is a continuation of our previous newsletter where we talked about climate change and its impact on the agricultural ecosystem. In this edition, we take a step further and explore how climate change ties in with food security in the country and what the microfinance sector can be doing to improve the food value chains. A sizeable portfolio of microfinance GLP is tied to the agricultural sector, therefore it is imperative that we do our part in helping sustain and improve the

agricultural sector not only to ensure repayments but to meet our mission of socio-economic uplift as well. We will also talk about the locust crisis in a special report.

We welcome thoughts and feedback, as well as suggestions on topics to cover in future issues. Our hope with this newsletter is to build a community of engaged readers interested in sincere discourse about the challenges and opportunities we face as a sector, the disruptions (technological or otherwise) required to serve our customers better and build an inclusive Pakistan. Wishing you all are staying safe and healthy.

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# What are the major factors for food insecurity in Pakistan? How can food value chains be improved to address food security within Pakistan and across regions?

By Anusheh Naveed Ashraf - Head Digitization, Research & Strategy

While the agriculture sector is the backbone of the Pakistani economy in terms of contribution to national GDP as well as employing a major portion of our labor force, the country faces a constant and ever-growing food security threat. As of 2018, 43% of Pakistan's population is food insecure with the country ranking among the seven countries that cumulatively account for two-thirds of the world's undernourished population.

Inefficient and outdated farming practices, a lack of adequate farming advisory services, lack of access to appropriate amounts of credit facilities (an area U Bank and other MFB's are constantly working in improving), climate change related challenges (explored in depth in our previous issue), the recent pandemic and perhaps most significantly food waste at all stages in the agricultural value-chain, have collectively contributed to steadily exacerbating the country's food security problem.



Source: Fact sheet compiled from data taken from; Pakistan Bureau of Statistics, UN World Food Program, Ministry of Finance – GOP, FAO.

## Food security and food wastage

According to the FAO, food security exists when “all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”. Food wastage comprises of food loss and food waste. Food loss “refers to food that is lost at production, post-harvest and processing stages in the food supply chain”. On the other hand, Food waste refers to “food discarded at the end of the supply chain, by retailers or consumers”. Compared to developed countries, in developing countries such as Pakistan, more food is wasted at the early and middle stages of the food supply chain i.e. food loss rather than

food wastage. One estimate quotes that 40% of food in Pakistan is lost during the entire supply chain i.e. production, post-harvest, handling, agro-processing, distribution and consumption. Numerous studies have documented the relationship between food wastage and food security, citing that reducing the former will contribute to strengthening the latter. However, this cannot be looked at in isolation as wastage interventions alone do not guarantee food security. More holistic approaches to attaining food security need to consider the broader context of the food value chain.

## Food value chain approach

Typical stages of the food supply chain are depicted in Figure 1. These stages can also be demarcated as upstream i.e. farming and input supply, midstream i.e. processing and wholesale and downstream i.e. retail. Not just identifying food wastage, but classifying its entire journey across stages of the value chain is essential to addressing food security.

In developing countries, the production or **upstream** end of the value chain is largely characterized by small-holder farmers i.e. between 70 to 95% of the farming population. In Pakistan, over 80% of the farmers operate on a small-scale. The accompanying limitations of this level of farming such as lack of labor due to

affordability constraints and compromised quality of inputs result in significant productivity shortfalls. Citing the example of citrus farms in Pakistan, Ghafoor et. al report that shortages of agricultural credit and expensive input which is a pre-requisite for citrus production, have significantly lowered the potential of production in the Sargodha region. Furthermore, limited market surpluses of small-holder farmers raises the unit cost of assembling, handling, and transporting their produce.

**FIGURE 1: FOOD LOSSES ALONG THE VALUE CHAIN**

	01	02	03	04	05
<b>VALUE CHAIN STAGES</b>	<b>Production</b> Preharvest Harvest Breeding	<b>Post Production</b> Handling Storage Transport	<b>Processing</b> Canning Packaging Transformation	<b>Distribution</b> Retail Transport	<b>Consumption</b> Preparation Table
<b>CAUSES OF LOSS</b>	Damage/spillage Left behind in fields Pests/diseases Weather Wrong inputs	Degradation Pests Premature animal death Spillage	Degradation Discard Spillage	Degradation Discard Excess supply Spillage Spoilage	Discard Excess preparation Spoilage

Source: International Food Policy Research Institute (IFPRI), 2016 Global Food Policy Report, chapter 3, Reducing Food Loss and Waste.

To add to these already significant problems, developing countries are heavily impacted by unpredictable weather patterns due to climate change, which impact farm output. For example according to the FAO, in Africa, climate change is projected to have significantly reduced the area that is suitable for cultivation of key crops such as maize, millet and banana. Similarly, a study has found that global warming is linked to an increase in agricultural pests, which will lead to loss of food that would otherwise have moved onto the processing stage. The recent locust crisis that has devastated the Pakistani agricultural sector (covered in greater detail in the next section) is an example of this and a warning sign for an even greater threat to food security in the country in the future.

Moving to the processing, wholesale and transport or **midstream** level of the value-chain, in developing countries brings another set of challenges with it. The food supply chain comprises of some large firms but is largely characterized by numerous small and medium sized firms supporting the “efficient movement of required materials, information, as well as the transportation of the final product from factories to the markets close to the customers”, explain Ngeugan and Mafini. In Pakistan, among the main concerns at this stage is lack of awareness of the latest processing methods, technology and lack of appropriate cold storage transportation which result in estimated post-harvest losses of up to 40%. Furthermore, the unreliable energy supply infrastructure further exacerbates the problem.

Due to the unorganized and widely dispersed nature of small farm producers, food processors find it difficult to deal with them, and also face lack of reliable supply of quality food. The produced food has to be transported for processing and packaging to large firms and SMES’s. The entire supply chain utilizes transport from production to consumption level and vulnerabilities of the transport system as well an absence of

adequate cold storage transportation solutions can translate in weak links in the food supply chain. According to the Asian Development Bank the lack of adequate infrastructure when transporting food can increase the risk of ‘chronic food security among vulnerable groups’.

Another problem is Pakistan’s over-reliance on cash-crops such as cotton and sugarcane. More of our cultivatable land is used for the production of these crops rather than food contributing to our food security and nutrition related problems.

While food waste at the consumption level is often given much visibility in the media, it is in fact not a significant contributor towards food insecurity and **downstream** food wastage at this level as compared to postharvest food losses. While not the biggest problem, it is still important to consider waste generation at the consumer level particularly with rising population and urbanization.



## Roadblocks across the value chain and possible solutions

	Roadblocks/Reasons for food waste and loss	Solutions
<b>Upstream Farming &amp; Input Supply</b>	<ul style="list-style-type: none"> <li>■ Lack of labor, small -holder farmers can't afford to employ helping hands</li> <li>■ Compromised quality input – poor variety seeds &amp; fertilizers</li> <li>■ Inadequate agricultural credit</li> <li>■ Unpredictable weather due to climate change</li> </ul>	<ul style="list-style-type: none"> <li>■ Integrated value-chain with a wide variety of stakeholders coming together to strengthen the value chain</li> <li>■ Opportunities to help farmers graduate into more substantial holdings &amp; better credit facilities</li> <li>■ Better business advisory and extension services, training on utilizing technology and learning how to manage their finances</li> <li>■ Greater public and private R&amp;D</li> <li>■ Using innovative techniques like vertical &amp; aqua farming</li> </ul>
<b>Midstream Processing, wholesale &amp; transport</b>	<ul style="list-style-type: none"> <li>■ Outdated processing methods &amp; technology</li> <li>■ Lack of adequate storage – reduces shelf-life of produce</li> <li>■ Flooding &amp; other similar climate shocks – impacts transport</li> <li>■ Lack of appropriate packaging solutions &amp; cold-storage transport solutions</li> <li>■ Dispersed production &amp; lack of infrastructure</li> <li>■ Non-compliance with international food safety &amp; quality standards</li> </ul>	<ul style="list-style-type: none"> <li>■ Interventions by small transporters, cold storage and warehouse operators, wholesalers and processors</li> <li>■ Credit guarantees, agricultural/rural investment funds, and credit and savings products</li> <li>■ Public-private partnerships for agricultural credit provision</li> <li>■ Greater credit facilities that help transition from labor intensive to capital intensive models thereby reducing waste &amp; increasing output</li> <li>■ Using more climate resilient technologies – e.g. solar processing units</li> <li>■ Role of government in improving infrastructural elements e.g. roads, railways and communication networks</li> <li>■ Improvements in market structures and market related activities e.g. online marketplaces &amp; price lists</li> </ul>
<b>Downstream</b>	<ul style="list-style-type: none"> <li>■ Rising prices and the resulting adverse effects on nutrition status</li> <li>■ Waste generation at the consumer level</li> </ul>	<ul style="list-style-type: none"> <li>■ Consumer level health and awareness campaigns</li> <li>■ Food labelling laws etc.</li> <li>■ Greater harmony in government interventions i.e. policies to increase production need to come with protections for consumers against higher prices.</li> </ul>

### Innovative Food Value Chain Solutions:

In addition to the issues highlighted above, evolving consumption patterns, complex value chains, globalization and trade, all point towards the need for departing from the traditional way of addressing causes of food wastage at each stage, towards an integrated value chain solution. Such an approach requires coordination from a wide variety of stakeholders across the value chain and beyond. According to ADBI “To effectively integrate the agricultural value chain in the region, there is a need to overcome the key challenges in the upstream, midstream, and downstream levels of the value chain, from delivery of vital agricultural inputs to distribution of agro food products”.

While farming is among the world’s oldest professions, it is now increasingly at the center of cutting-edge technology developments and scientific research especially due to the exacerbating nature of food security related problems caused

by climate change and now a global pandemic that has impacted all stages of the value-chain in one way or another. A major contributor has been the involvement of big corporations within the agriculture and food technology space due to the global nature of the problem. Some of the most innovative advancements within the sector are listed below:



## Traceability & multi stakeholder collaboration:

Traceability is “a system to track a product from production to consumption — a critical tool for operationalizing standards and regulations through increasing transparency across food supply chains”. It can create value and identify losses in the supply chain, which is a big challenge for developing countries where approximately 14-21% of production of fruits and vegetables is lost during processing, compared to a loss rate of 2% in developed countries. Traceability can lead to supply chain optimization, supporting sustainability goals, greater likelihood of preventing food security issues and facilitating tracking of agriculture production processes. Technology enabled end-to-end traceability could represent a significant change in how supply chains are managed. In addition to pinpointing and

resolving issues at individual levels of the food value chain, stakeholders need to cooperate and collaborate across the three levels. Considering traceability, stakeholders across the value chain can play their part in making the system a success. At the government level, the state can incentivize traceability and support adoption of relevant technology. Technology companies can develop the transformative technologies to reduce costs, and maximize efficiency. Retailers can play their part in coming together with other stakeholders to bring about transparency. Agribusiness companies can support the application of traceability for food value chains, by being open to it and considering new business opportunities through it.

 Core transformative technologies supporting innovation in traceability initiatives

### Changing the shape of demand



**Alternative proteins**  
Agriculture's impact on freshwater withdrawal could reduce by 7% - 12%.



**Food-sensing technologies for food safety, quality and traceability**  
Reduce food waste by 5% - 7%.



**Nutrigenetics for personalized nutrition**  
Reduce total global overweight population by 1% - 2%.

### Promoting value-chain linkages



**Mobile service delivery**  
Increase farmer income by 3% - 6% and reduce food loss by 2% - 5%.



**Big data and advanced analytics for insurance**  
Farmer income could increase by up to 2%.



**Internet of things for real-time supply chain transparency and traceability**  
Reduce food loss by 1% - 4%.



**Blockchain-enabled traceability**  
Reduce food loss by 1% - 2%.

### Creating effective production systems



**Precision agriculture for input and water-use optimization**  
Reduce agriculture's impact on water use by 2% - 5%.



**Microbiome technologies to enhance crop resilience**  
Increase farmer income by 2% - 3% and reduce food loss by 1% - 2%.



**Off-grid renewable energy generation and storage for access to electricity**  
Increase farmer yields by 4% - 7% and reduce agriculture's impact on freshwater withdrawal by 4% - 8%.



**Gene-editing for multitrait seed improvements**  
Increase farmer income by 1% - 2%.



**Biological-based crop protection and micronutrients for soil management**  
Increase yields by up to 1% and reduce agriculture's greenhouse-gas emissions by up to 1%.

Source: *Innovation with a Purpose: Improving Traceability in Food Value Chains through Technology Innovations* by World Economic Forum in collaboration with McKinsey & Company.

## Internet of Things & Food Sensing:

By collecting comprehensive and consistent data about food products companies, startups and farmers are not only able to monitor health of produce and livestock but also able to manage their farms and livestock much more efficiently. IoT tools and equipment help with tracking and monitoring and also enable on-farm automation (e.g. milking) and the introduction of smart equipment such as smart sprinkler based irrigation systems, grain-drying silos, drone enabled pesticide delivery and even robots for harvesting. The data integration from these solutions and the use of artificial intelligence is also enabling smarter farming via crop monitoring and prescriptive farming.

99% of all crop diseases are attributed to irregular irrigation cycles. Smart sensing solutions such as smart irrigation systems, climate and soil sensors offer solutions that can, according to some estimates, improve yields up to 35% and lead to 70% cost savings (water, power, labor) in inefficient farming ecosystems such as those in Pakistan.

Furthermore, solar based IoT solutions are making significant contributions towards making the food value chain more

resilient and resource and energy efficient through the use of solar powered tube-wells and processing units. In the Hunza region, solar processing units to dry fruits (e.g. apricots) are already yielding great results and reducing the amount of wastage that occurred due to the lack of access to markets and processing facilities in the region.

## Vertical Farming:

With rising urbanization globally, the food security problems will only continue to rise. In the face of this reality vertical farming presents a smart urban solution to boost food production and consequently address food insecurity. The practice involves controlled-environment agriculture especially designed to optimize plant growth and using soilless farming techniques such as hydroponics, aquaponics, and aeroponics. Some of the advantages of this technique include: increased crop yields resulting from smaller unit land requirements, ability to cultivate a variety of crops at once due to lack of dependence on the same plot of land and most importantly the indoor nature of the farming facility which means less food waste resulting from extreme and unexpected weather changes.

Experiments in vertical farming are already under-way in Pakistan, but there is a need for larger scale and more concerted efforts to make this method viable and more widely acceptable.

#### Marketplaces:

Technological innovations on the market side are working on direct solutions such as “farm to table” which seek to connect farmers directly to suppliers or consumers without any middlemen. These solutions are in the form of e-commerce platforms, as well as solutions that use technology to facilitate physical marketplaces. Even small innovations like real-time, digital price lists can have a huge impact in Pakistani sabzi mandis. While eliminating the middleman or arthi from the ecosystem in Pakistan is near impossible and akin to inviting more trouble within the value-chain, efforts can be made to bringing the arthis on-board with these technological

advancements by offering unique value-propositions to them as well and hence improving the overall efficiency of the food value chain.

#### Logistics:

Companies like Uber and Careem are already disrupting individual level transportation and mobility and are beginning to now dip their feet within the logistics industry by on-demand freight truck provision - can a solution be created to disrupt farming output transportation? As already discussed earlier, the dispersed nature of small-holder farms in developing contexts like Pakistan poses significant transportation challenges. Could a geo-tagged, on-demand Shehzore or food delivery truck streamline this part of the value-chain?

## What role can U Bank and MFB’s play?

The simplest way that MFB’s can participate in improving the overall food-value chain is to design financing products that encourage farmers to adopt new practices and technology based solutions. Microfinance institutions are uniquely placed to address problems within the Pakistani food-value chain. This would demand running multiple experiments, some of which will fail as they go through the iterative process. While MFBs typically work within the riskier credit provision environment, due to challenging economic conditions, an unwillingness to innovate and depart from the traditional way of doing things and the aftermath of the global pandemic, they are becoming more and more risk averse. However, engaging in smart asset based lending for some of the solutions and innovations listed above will not only help MFBs diversify their portfolio and hedging their risk while meeting their mission of creating social impact, but at the same time lead to long-term benefits in the countries food security status.

Microfinance institutions also need to move away from the silos approach where they only look at the financing and financial inclusion, and/or try to bite off more than they can chew by trying to build such solutions from scratch. The need of the hour

is to open up and partner with different categories of actors with skills and capacities that complement each other to solve these national and global level problems. A great example of this collaborative approach can be seen in action when the social enterprise ACRE Africa was able to protect 400,000 farmers against the risk of drought in Kenya, Rwanda and Tanzania. The solution offered a three-week insurance to all farmers who bought a bag of seeds and used geo-locating technology (by sharing a code via SMS). In the eventuality of rainfall shortages to guarantee germination the farmer automatically received mobile based compensation to replace the bag of seeds and replant in the same season. The ACRE micro-insurance product was only made possible due to the combined efforts of diverse stakeholders i.e. insurance and reinsurance companies, microfinance institutions, input suppliers, telecom partners and satellite data providers acting together. This kind of collaboration is needed to be able to reap similar benefits. If players keep acting in silos, Pakistan’s food value-chain and security problems will only worsen.

## Special Report: *Pakistan’s Locust Crisis*

By *Duaa Amina Noor* - AM Research & Innovation

### *Introduction*

The impact of climate change and shifting weather conditions is far-reaching and profound. This is evident in the positive correlation between rising temperatures and increasing number of locust swarms. Experts from research and policy fields unite in agreeing that the locust invasion of 2019-2020 originated as warmer seas generated more cyclones in East Africa,

which provided the perfect breeding ground for locusts. The invasion has been felt at a global level, as a gregarious migratory swarm of locusts has the ability to travel up to 150 km per day. Hence, this year’s outbreak which originated in the horn of Africa spread to the Middle East, and onwards to South Asian countries, including Pakistan. Among the affected

areas, this has been the most deadly outbreak in Somalia, Pakistan and Kenya for 25, 30 and 70 years respectively. Furthermore, its impact has been felt at various levels, and in the wake of a global pandemic, this has hit a troubled world even harder.



<sup>1</sup> Case study taken from the Microfinance Barometer 2016.

## *Impact of locust outbreak - social, economic and environmental*

The UN has warned that the current outbreak could lead to a global food security issue, with the FAO estimating that it could impact 25 million people worldwide. Moreover, the situation is worsened for some affected areas, where the attack comes in the wake of a pre-existing food security crisis.

At a national level, the biggest example of this is Yemen, i.e. a country plagued by war and political instability, which also ranks at the bottom of the Global Hunger Index, second only to the Central African Republic. In Pakistan, the FAO reports that 38% of the country is under threat of locust attacks. The provincial breakdown of threat stands at 60%, 25% and 15% in Balochistan, Sindh and Punjab respectively. Considering this, the province most at risk from the attacks i.e. Balochistan is also ranked by the UNDP as Pakistan's poorest province. Additionally, the State Bank of Pakistan reports that 30% of households in Balochistan experience hunger on a chronic basis. Therefore, vulnerable regions already plagued by poverty and food insecurity will be exposed to unprecedented levels of crisis, risk and malnutrition because of

the outbreak.

The economic losses associated with the locust invasion are also monumental. The FAO reports that in Pakistan losses to agriculture - which contributes around 20% to the country's GDP - could reach PKR 205 billion (USD 1.3 billion). Additionally, Pakistan's textile industry which accounts for 60% of the country's exports will also take a hit. This year 9.45 million bales are expected to be produced, i.e. the lowest since 2015, and 26% below the industry target. To counter this, Naseem Usman, chairman of the Karachi Cotton Brokers Forum, claims that imports for cotton this year are approximated at 5.5 million to 6 million bales, which will ultimately negatively impact the country's balance sheet and foreign exchange earnings.

Furthermore, food prices spike with food security crises. This is particularly devastating for poor rural households that struggle to keep up with food price inflation and end up spending the majority of their income on basic sustenance. Overall, the 'twin plagues' of Covid-19 and locust attacks have hit the Pakistani government at a time when it is

already struggling with inflation that reached a 10 year high of 14.6% in January 2020, in addition to juggling shortages of essential food items like sugar and wheat. Apart from the costs stemming from the attack, there are also significant costs of controlling the outbreak. Provinces have had to divert substantial economic resources in the midst of the on-going pandemic, to controlling the pests.

Although less highlighted, there are also environmental repercussions of combatting locusts. Speaking on this, Linda Munyao, Vice Chair of the Environment Institute of Kenya, states that chemical sprays and pesticides used to kill the pests have extremely damaging effects on the environment. These can negatively impact biodiversity, and destroy essential species and organisms, which are conducive to agricultural activity. Moreover, emitted poisonous fumes can remain in the environment for a considerable amount of time, allowing them to seep into nearby soil and water resources and create health hazards for inhabitants of the area.

## *What is being done and gaps – the Pakistani context*

According to Cyril Ferrand - emergency and resilience programme officer at the FAO - the 'game changer' for this year's attack was favorable climatic conditions. There was not complete absence of measures – just not enough to deal with the overwhelming quantity of swarms. Still, this does not discount the gaps in government response to this outbreak. In

Pakistan, since its establishment in 1950, locust control operations fall under the ambit of the Department of Plant Protection (DPP), under the Ministry of National Food Security and Research (MFSR). Since a national emergency was declared in January 2020, this brought together the DPP, National Disaster Management Authority (NDMA),

Provincial Agriculture Departments, and armed forces, to play their part in locust control operations. Broadly, the major responses fall under 1) mobilization of physical and 2) financial resources, 3) monitoring and evaluation.

## *Mobilizing physical equipment*

To combat the crisis, there has been procurement of physical equipment at a large scale. To date, majority of treatment has been done via Ultra Low Volume (ULV) vehicle mounted sprayers. The DPP had 20 such sprayers in the 1980s, however when the current attack hit, it only had one functioning ULV left.

Essentially this meant that since the last major outbreak in 1993, i.e. 25 years ago, there was no preparedness and maintenance. This raises the question of why precautionary measures and resources were not in place in a country which has been historically susceptible to locust attacks. Furthermore, while

international aid has also provided relief e.g. China has sent 15 air powered sprayers and 50,000 liters of Malathion, whilst the FAO has pledged 20 micron air sprayers, Pakistan cannot continue to rely on it, in the absence of an adequate internal response system, which is the first response in case of an attack.

## Provision of funding

Considering the recently presented budget, the federal government has allocated PKR 10 billion for agriculture – which is below the budgeted numbers at the provincial level i.e. Sindh and Punjab have set aside PKR 14.8 billion and PKR 31.73 billion respectively. In response, there is criticism that the center has not made agriculture a priority, and that currently dedicated funds are insufficient to resolve preparedness and coordination issues.

Considering government perspective, this year's task of setting a federal budget was more complicated because as

summarized by Dr. Abid Qaiyum Suleri, the 'Four L's' i.e. lives, livelihoods, lockdown and locusts needed to be considered. Considering the presented budget, the government needs to make upward revisions for its development expenditure, particularly towards locusts, food security, and scientific research towards climate-smart agriculture. These are essential features of the governments 'survival budget' and without incorporating them, there will be social, economic and environmental implications in the long run. Furthermore, as with physical equipment, international aid has been mobilized through funding.

However, in order to make the most efficient use of these funds, investment needs to be channeled into empowering institutes. Towards this end, the MFSR has received funds from the World Bank and Asian Development Bank as a 'direct response to the consensus that the ministry's policy function and coordination role across provinces should be significantly strengthened.' International aid will be best utilized and, economic, social and environmental safety ensured only when there are strong internal, coordinated institutions in place to manage funds.

## Monitoring and evaluating

In order to fight locust swarms, it is imperative to understand them. This can be done through surveillance and monitoring tools to decipher the migratory pattern of pests. Under the DPP, a comprehensive 3-phase National Action Plan for Surveillance and Control of Desert Locust, 2020-21 (NAP-DL-Pak) was prepared and adopted by the Cabinet. Figures from May 2020 show that out of a total area of 437,900 square kilometres, 161,720 square kilometres were declared as vulnerable to locust attacks. Additionally, a 124,299 square kilometres area has been surveyed in vulnerable areas of attack out of which

8,843 square kilometres were treated. However, critics maintain that even though surveys are being carried out, they are being done to the original effect. This is because the DPP's priorities changed over time from locust survey and control towards the mandate of regulating import of pesticides which was given to the department.

A positive step is Pakistan's participation in the FAO commission for controlling desert locusts in South-West Asia (SWAC). Through this forum, country representatives convene to discuss progress in monitoring swarms along

with data insights. Another tool being utilized is the FAO's E-Locust software, designed to enable rapid detection of locust outbreaks and migration patterns. The FAO has launched a mobile compatible version of it in Pakistan, with required training being provisioned through DPP staff and partner institutions. The government needs to continually make such efforts to improve capacity for early warning systems so that locusts can be located at ground level, and fought at this stage, versus when they become airborne and consequently difficult to eliminate.

## Private sector support

Private sector stakeholders are a fundamental component of local communities affected by humanitarian crisis, hence while government efforts to fight the pests are critical, contribution from private sector actors is also important. This has recently picked up

pace in Pakistan, where most recently, the Ministry of Science and Technology has partnered with private sector manufacturer of aerial vehicles - 'ABM-Satuma' to develop and manufacture drones for locust surveillance and control operations. Similarly, animal feed giant,

Hi-Tech Feeds has initiated testing of using locusts as poultry feed, which if successful in the long-run could lead to utilizing the pests for meal production as well as saving money on the import of soybean i.e. a major source of protein incorporated in animal feed.

## Conclusion

Overall, at a national level, there needs to be greater effort on part of the government to strengthen internal capacity to deal with current and future outbreaks. This translates into coordinated efforts between the center and the provinces for mobilizing equipment and funds in the right direction, implementing a robust

preparedness and management system, advancing scientific research and monitoring of swarms, strengthening national level institutes and involving private sector actors. Considering the bigger picture, as the attacks are a direct consequence of climate change, there needs to be a movement towards adopting climate-smart agriculture

practices and using nature-based pesticides for combatting locusts. In fact, a study by the University of Arizona reveals that locusts are less attracted to crops that are grown sustainably, as opposed to those that are rich in carbohydrates and sugar.