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Re-thinking Desert-locust Emergency Operations Supply-Chain in the Age of Worldwide Pandemics

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Abstract: FAO is supporting local governments facing Desert Locust (DL) invasions. Authorities responsible to respond to similar crisis may count on FAO's holistic, well-developed approach that grants quick access to, among others:

- Essential, good-quality, technical inputs and services for DL survey and control emergency operations, including dangerous goods (such as chemical pesticides) and equipment for the related safe waste-disposal.
- SOPs for survey and control operations start-up and implementation as well as safe warehousing, management & monitoring of dangerous goods along their entire life cycle;
- Inter-state bilateral cooperation opportunities under FAO's patronage (so called "triangulations").

The past crises showed how important is the regular survey & control of critical geographical areas, prone to swarms growth, for prevention of new outbreaks. The latest crisis clearly show, however, that no matter how good a single local government is in introducing effective preventive measures, a new crisis could always hit its territory, due to the unpredictable and international nature of DL-crises. If this happens, when facing also a worldwide pandemic, lack of risk management, resilience, and agility in supply-chain may nullify all previous efforts.[1]

This paper will analyse first the DL-crises recurring supply-chain challenges and will present the specific context of the latest, still ongoing, crisis to show how the Covid-19 Word-wide Pandemic affected the supply chain of the key technical inputs forcing FAO to adjust its initial sourcing and supply-chain strategy.

The conclusions of this analysis are three concrete proposals for possible reinforcement of DL emergency supply-chain setup and, ultimately, FAO's capacity to manage these crises offering improved support to governments' response plans, i.e.:

1) A new funding model enhancing new solutions for DL emergency supply chain and a new approach to crises management that build-in the overall resilience of supply networks;

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[1] Richard Wilding, professor of supply chain strategy at Cranfield School of Management, said the virus had exposed supply chain failings. "Once more, the lack of risk management, resilience and agility in supply chain has been exposed", he said. "The way forward is to admit things will go wrong and to build up resilience across supply networks during the good times-talking and sharing to create collaboration and trust, which will then be invaluable through the hard times". (Ref. Supply Management-CIPS, March/April 2020, page seven, "Supply chain rethinking?").

2) Strengthen FAO's emergency coordination role to introduce smart supply chain technological innovation;
3) Explore further new Private-Public-Partnership (PPP) opportunities to go beyond traditional sourcing.

These proposals acknowledge the strategic role of the Procurement and Supply Chain Function for future successful response to complex DL crises considering the limits of the traditional crisis' preventive measures, which clearly emerged during the Covid-19 Pandemic that represented an exceptional stress test to measure their efficacy.

Key words: emergency supply-chain innovation, resilience for business continuity, desert-locust crisis, Covid-19, private-public partnership

JEL codes: O, O3, Q, Q1, Q110, Q160, Y, Y2

1. DL-Crisis Supply Chain Recurring Constrains and Challenges

When the new crisis started, at the beginning of 2020, it was far from being completely unexpected. FAO experts already detected, end of 2019, a deteriorating situation in the Arabian Peninsula with immediate risks for the Horn of Africa. However, the subsequent events show how difficult is to predict when a new DL upsurge will actually occur, and where exactly, sufficiently in advance to timely activate a response, especially without counting on a supply-chain relying on preparedness measures as pre-positioned stockpiles of key inputs in strategic hubs or fast activation of existing contracts with pre-qualified service providers. Similar preparedness solutions were discussed at the end of the last crisis that hit Madagascar, back in 2016, when FAO hosted a workshop with the active participation of governments, suppliers, and other key DL experts.

A major constrain faced until today for implementing these measures is the current funding method, which makes that the financial resources required to respond are available only after that a crisis is declared.

Another problem, which may explain the reduced appetite for any stockpiling mechanism for DL Emergency Ops technical inputs, is the bad experience of governments that remained with large stocks of perishable toxic product after the crisis ended. Indeed, if not used before they expire, these goods may be safely and efficiently disposed only with a coordinated and expensive plan at international level. While FAO has been actively supporting such initiatives among concerned member states, key industry players and governments shown, in several occasions, real concerns for the management, and especially the safe disposal, of these old stocks.

Furthermore, regardless the existence or not of a preparedness mechanism, DL Locust Emergency Ops technical inputs supply chain presents peculiarities which make it prone to bottlenecks difficult to overcome. This is due especially to the limited market supply Vs. the entity of the demand picks of specific inputs, which are both the result of the specific nature of the Desert Locust crisis itself.

The substantial unpredictability of the DL-crisis cycles determines a very unstable market demand, which makes difficult for the few existing market players to scale their supply capacities in view of a possible new crisis, and for potential competitors to have a real incentive to invest for possible access to a new market. When the crisis eventually starts, instead, the risks for the agriculture sector are so high for the concerned countries that the local authorities immediately consider the urgent sourcing of the required inputs to stop the invasion as a political priority. This causes a pick on the international demand that suppliers are often unable to attend, at least not as quickly as desired; and which determines not only prices instability from the supply side but also a decision-making, from demand side, often driven by emotion and not necessarily well pondered.

Another bottleneck impairing the good functioning of the supply-demand interaction in DL technical inputs market is represented by the lack of clear policies and procedures regulating fruitful, preliminary (and not entirely commercial in its first stage) ex-change of information, experience and technical knowledge between public entities, including FAO, and key industry players and/or private start-ups. These kind of relationships may be, indeed, key for introducing technological innovation aimed to equip those responsible for responding to future crises with more efficient technical solutions largely and easily accessible on the market when needed. Yet, in the absence of a clear legal framework for this kind of relations, it is difficult for public actors, following public procurement best practices on conflict of interests, to access to the potential advantages that this kind of cooperation may offer.

A smart answer to all these challenges and constrains has been identified, and actually extensively used in the past years with good results, i.e., to reinforce the crisis-prevention mechanism in the different countries prone to DL-crisis. Internationally coordinated, and regular, survey and control activities, conducted by trained national DL (survey & control) teams deployed in key geographical areas where usually DL swarms may grow, proved to be very effective in the past years, especially when the different teams share data and experience. FAO offered technical and financial support to concerned governments for this kind of activities. This solution is in general cost-effective; optimizes use of scarce resources, and its environmentally sustainable, limiting as much as possible spraying operations using very small quantities of ULV-formulated chemical (or biological) pest regulators.

However, the last crisis shows how fragile this solution could be, and which are the consequences of its failure. Indeed, this solution requires safe and regular access to specific geographic areas for well-equipped DL survey-control teams. When these basic conditions are not met, however, as it happened in the past months in Yemen due to the ongoing war, the preventive mechanism becomes ineffective to stop a crisis not only in the specific country but also at international level. Taking advantage of climate conditions and winds, DL swarms, likely originated in the Southern Arabian Peninsula in early 2020, quickly grew and moved into Kenya, Ethiopia and Somalia, igniting an international crisis already affecting, or threatening to affect soon, more than 18 countries all over the World.

The two following sections will explain why an efficient and rapid emergency response mechanism, centred on preparedness and supporting the existing crisis-prevention system (which alone could be insufficient), is key to face unavoidable crises.

2. The 2020 DL-crisis and FAO's Initial Response

The crisis that started in January 2020 presented immediately several, serious aspects of special concerns.

First, the geographical extension of the crisis appeared immediately extremely large, covering Kenya, Ethiopia and Somalia, and with a high potential to expand further very quickly, covering entire regions, in different continents, all with a large number of people already exposed to high risk of hunger and malnutrition. This introduced an extra-layer of complexity to the crisis, as it required a high-level of coordination of the several actions (from needs assessments to sourcing strategies definition) to conduct in the different countries from the very beginning, thus to prepare and implement an effective international emergency response optimizing as much as possible use of dangerous products.

Second, differently from the past crises, the new crisis hit, or threaten to hit, a large group of countries (e.g., Yemen, Somalia, South Sudan, Niger, Mali, Burkina Faso) where FAO local offices are already facing Level-3

emergencies with limited resources. The additional workload that a new similar crisis represents for the FAO's already overstretched operational and logistic capacities, both at local and HQ level, required urgent scaling up, which required time to be enacted, to ensure that the existing resources were not completely overwhelmed.

Third, some of the areas affected since the beginning, such as Somalia and Yemen, are of very difficult access, especially for the aerial spraying operations but also terrestrial survey and control visits, often a key component of effective and targeted control operations. This represents a serious constrain not only from a mere operations perspective but also in terms sourcing options. It reduces, indeed, the range of products available for killing swarms before they move from these areas; and less sourcing options may results in average longer supply-chain lead-time, which is definitely something you would like to avoid as much as possible when facing similar emergencies.

FAO designed its initial supply chain strategy to source all key technical inputs required by the governments in the concerned countries to respond to the new emergency capitalizing as much as possible on its experience and current strengths, i.e.,

- Strict collaboration among the emergency/operations, technical and procurement teams in HQ for immediate issuance of public advance tenders for pre-qualification of suppliers of key inputs and services required in all countries, such as bio-pesticides, ULV-formulated chemical pesticides, ULV spraying apparels, GPS equipment, aerial-spraying services, etc.
- Locate existing stocks of useful inputs for possible triangulations, and identify the different, optimal combination of products to use in the different countries, having in mind also possible bottlenecks that similar requests from the same may cause on the supply side.
- FAO field offices received then ad-hoc authorizations to avail of the results of the different market research for restricted-tendering (BAFOs) and direct contracting of selected suppliers, under supervision/coordination of HQ procurement team.
- Deployment of Int'l Procurement Officers (IPOs) in key concerned field offices.
- Direct, close monitoring and coordination of all DL-related sourcing activities (from tendering to contract management) conducted by the different field offices from HQ Procurement services.
- Direct contracting and contract management support for the more complex services contracts ensured from the HQ Procurement Services.

To note here that, although FAO has contracted global freight forwarders for shipment services, not having a well-structured logistic department, as other UN agencies have, all advance tenders were requesting bidders to quote on both FCA and DPU basis, based on initial estimation of quantities of inputs that the different, possibly, concerned countries may need in the coming months. FAO's current standard practice is to rely on goods-suppliers' logistic capacities to deliver the goods directly to final destination countries, where FAO local offices have limited resources/capacities to arrange the logistic separately.

The main objectives of the strategy were:

1) To ensure sufficient flexibility for each office to start when eventually funds became actually available for official commitments and exact needs were clear;
2) To streamline and control the initial assessment of suppliers' technical and commercial capacities (quality standards of goods and packaging, certifications/import authorizations, production and logistic capacities, stocks existence, etc.). This also to ensure as much as possible consistency and quality standards of FAO's support to the different countries;

3) To reinforce the capacities of concerned FAO field offices to manage the supply-chain of the required inputs in their respective countries directly in collaboration with the suppliers, while keeping an overall control of the same at HQ level.

Before end of Feb 2020, FAO had started implementing the above strategy and the field offices of the concerned countries had initiated to offer support to the respective local counterparts. However, the results of FAO's advance tenders had shown, one more time, the well-known market constrains (see paragraph above). For some inputs, such as sprayers, bio-pesticides and drum crasher & cleaners a sole-source scenario appeared clear (though for different reasons). For other goods and services, such as chemical pesticides, bio-pesticides, sprayers, aerial-spraying services, the market-supply capacities appeared already unable to absorb the demand pick, which was reasonable to expect, based on the preliminary estimated quantities indicated by the different countries for the advance tenders.

To mitigate the risks that such limits represent for an efficient emergency supply-chain, FAO started activating also alternative sourcing mechanisms. From one side, possible "triangulation" of existing stocks of inputs (such as ULV chemical pesticides and sprayers) from donating to receiving countries with FAO's support for transport services. On the other side, FAO facilitated discussion/negotiations for possible donation of existing stocks owned by private entities directly to receiving countries.

In early March 2020, i.e., by the time FAO's support mechanism started working and first key contracts for most urgent and critical inputs required were already awarded for quick deliveries to final destination countries on DPU basis, the Covid-19 worldwide Pandemic started, disrupting almost immediately the entire plan.

3. The Covid-19 Pandemic's Impact and FAO's Supply-chain Strategy Adaptation

Suppliers awarded by the first field offices, starting their emergency response, for immediate delivery of existing stocks of goods, located in Asia, first informed FAO about the lock-down and consequent impossibility for them to deliver as originally planned and also to indicate a new, realistic delivery time in a short term useful for FAO to consider possible extension/contractual terms.

After that, it was European suppliers' turn to face problems due to the Pandemic: in some cases, the significant increase of the airfares made impossible for them to accept the purchase orders received, unless FAO was ready to accept the revision of the initial transportation costs offered. In other cases, the same suppliers were unable to keep their original FCA prices as these were quoted considering sourcing the raw materials, needed in the production cycle, from Asian partners who were now either unable to deliver at all or were quoting significantly higher transport costs. The original FCA prices could not be maintained also when considering possible alternative sources for the raw materials not based in Asia.

Regardless these prices variations, almost all awarded suppliers started informing FAO about longer delivery timeframe in view of the new situation. These delays are in general negative events for all Emergency Supply Chain. In case of DL-Control Emergency Operations, however, they are even more problematic as different products are effective only if sprayed during specific moment of the locust life cycle. This means that a delay in one only of the several inputs used for this kind of operations may compromise the effectiveness of the entire operation. Not to mention the waste of financial resources that such delays may cause, for instance when airplanes already deployed remain grounded due to the shortage/stock rupture of inputs that they need to use.

Abrupt border closure declarations and related new procedures for entering goods in the destination countries

during the lock-downs resulted also in blockages of large quantities of goods in transit, with suppliers, contracted on DPU basis, panicking for demurrage/detention charges incurred, and consequently starting refusing to execute new contracts on this basis.

All these problems forced FAO to quickly adapt its original sourcing/supply chain strategy.

First, a new round of advance tenders, re-grouping final destination countries in regions to be served as much as possible on a proximity-basis, enlarging the range of inputs acceptable for implementing operations, and including different commercial terms were issued during spring for new pre-qualification of suppliers.

Second, FAO started awarding new contracts on FCA basis to those suppliers refusing to take the risks arising from new context if they had accepted to be responsible for the logistics. This required FAO to start arranging shipments of goods using its contracted global freight forwarders (FFWs). Under the new context, this solution presented several advantages, such as:

- Increased flexibility to ship goods, made available on FCA basis after a while FAO had designed the initial international distribution plan of the inputs, where these were exactly more urgently needed at the time they became available.
- Increased tenders response rate, as bidders have to mitigate only risks related to FCA prices possible fluctuation.
- Increased certainty, for Budget Holders, of actual freight charges as these are calculated and provided when exact quantities of goods are ready for shipment and not at the time of bidding based on estimate quantities.
- Reduced transport-related risks and increased level of control for FAO on this process. Indeed, the FFWs determines better routes to use, in agreement with FAO, identified when, goods are ready for shipment at the suppliers' premises.

Third, FAO started, especially for specific, key suppliers with limited supply capacities (and often acting as de-facto sole sources not only for FAO), centralizing the awarding and contract management process at HQ level for concerned countries. This solution increases the level of flexibility to adapt delivery plans, facilitates the related, timely contracts amendment, streamlines communication with the suppliers, FFWs, inspection company, consignees, and the technical support along the entire contract execution. This new solution required relatively few additional resources for the Procurement team in HQ to create a dedicated DL HQ procurement team that works in strict collaboration with the IPOs in the field, as well as the Emergency Operations and the DL technical division teams, both in HQ and field offices. This core team was responsible also for special monitoring and support for all DL sourcing and supply-chain-related issued arising especially in small field offices, which continue to handle directly less complex, DL-related sourcing processes.

Finally, to adapt to the increased difficulties encountered by local authorities in moving DL survey and control teams on the ground, due both to lock-downs and limited safety in specific contexts, FAO decided to accelerate the project aimed to introduce use of drones technology for DL survey and control preventive operations. This project started in 2014 and in this new phase, FAO is trying to organize trials in real-crisis scenarios for the very first time. By doing so, FAO expects to capitalize quickly on the results obtained with past trials conducted in desert areas, though not during a real crisis.

4. Lessons Learned in the First Year of the Recent Crisis

Three recommendations for building in more resilience for business continuity in the future.

While the crisis has just ended in most of the affected countries end, the events occurred in the past months allowed FAO Procurement team to learn new, important lessons for possible future improvement of emergency supply chain strategies and solutions.

It is clear, for instance, that a risk-mitigation strategy based exclusively on preventive measures, aimed to avoid as much as possible new outbreaks keeping under control swarms incubating areas, is likely not sufficient to avoid new crises. This at least until the use of drones, replacing humans for regular survey and control operations, becomes (an efficient) reality. Even then, it is always possible that human (in-) action may neutralize this tool.

Similarly, to rely on a quick-response mechanism, designed and implemented every time in reaction to a new crisis, when this already started, presents traditional weaknesses that may be intensified by a disrupted international supply-chain hit by a dramatic event such as a worldwide pandemic.[2] Specific market supply constrains together with emotional, political drivers arising on the demand side during a crisis, negatively affect any quick-response mechanism that does not rely on well-designed preparedness measures. Game Theory teaches us that without any planning and previous arrangements, cooperation, even among states, and even if it is especially key to respond to large-scale DL-crises, does not prevail.

The large stocks of perished products, sitting in many governments' facilities waiting for safe and cost-effective disposal, should be looked as an evidence of this lack of cooperation, caused by emotional decision-makers under incredible political pressure created by lack of preparation, rather than as a disincentive for development of new effective preparedness measures.

Current experience, especially after having adapted the initial sourcing and supply-chain strategy in response to the new challenges that Covid-19 pandemic introduced, seems to indicate a way forward to work on future improved preparedness solutions.

The inputs triangulations coordinated by FAO this year among countries shows, for instance, that the traditional tool represented by technical inputs stockpiling, when these are not dangerous and perishable goods, remain an effective tool. However, the main problem currently is that each country decides how to constitute these buffer stocks (both quantities and type of inputs), without necessarily sharing information and coordinating respective actions in advance. The possibility for FAO to constitute directly stockpiles to be located in strategic hubs, complementing what individual states have, could improve the effectiveness of this mechanism.

The new role played in the past two years by FAO to facilitate donations of required inputs from big industry players, such as the pesticides producers who often acts via non-profit foundations, to governments of affected countries could represent another, new, interesting tool. If developed further in the future, to function in a more structured manner, this channel, alternative to traditional competitive sourcing, may reinforce a coordinated preparedness system at international level.

Furthermore, it is possible to capitalize on the recent experience of centralizing the awarding and contract management for key inputs, such as spraying equipment and bio-pesticides, combined with the use of global FFWs. This solution may become an interesting pilot for future development of an innovative Emergency Supply-Chain solution able to meet, together with FAO field offices' needs, also those of external clients, such as governments. When in place, this solution could significantly increase the level of international cooperation and

[2] Indeed, as already explained, this mechanism depends on lean supply chains that rely mainly on sole source strategies, which could be a cost-effective solution only until something goes wrong. See Supply Management CIPS, March-April 2020, p. 9, "Not enough room for manoeuvre in lean supply chain", Malcom Harrison, group CEO, CIPS.

reinforce the overall resilience to respond successfully to DL-crises.

Key goods suppliers used by FAO are supplying the same inputs directly to governments, which ends competing among them (and with FAO) and reducing their chances to obtain best value for money. The same suppliers shared with FAO their production plans indicating, together with the goods for FAO, also goods allocated to other clients (mainly governments). Their intention was to show the possible benefits achievable if the current strategy adopted by FAO for its own needs would be extended also to all orders currently received directly from the different clients for the same crisis. Indeed, this would allow using the flexible, well-coordinated system allowing the quick re-allocation of lots ready for shipment to the different destinations based on the evolving priorities of a fluid emergency. This system, applied to the entire international demand during crises, will ensure that priorities are determined, no matter who needs the inputs, by FAO's technical expertise and its knowledge of the international scenario rather than internal political pressure at national level. The possibility for external clients to access to FAO's DL supply-chain solutions, together with FAO's central role in managing DL-emergencies in the future, may help in overcoming the traditional barriers for new competitors to enter in the DL market supply and consequently supply's bottlenecks.

Under this new scenario, where FAO would play a central role in managing international DL-crises in a more coordinated manner, it is possible also to imagine an increased, regular and more innovative use of global FFWs. This means the possibility of introducing (and monitoring) the systematic use of predictive algorithms and AI to process big data to identify best routes for shipment in real time, and adapt them as required to reduce transport-related risks and optimize delivery time and costs, even in presence of a worldwide pandemic. This would represent an additional incentive for external actors to recur to FAO's new Emergency Supply-Chain solution, not to say the reduction of stocks levels that this system will allow and the overall quality control of the sourcing process.[3]

All future improvements envisaged above, however, are possible only if the following three final recommendations are taken in due consideration for further analysis possibly with the contribution of proper academic studies on the same subject:

1) A new funding model needs to be explored to support FAO's DL emergency supply-chain re-designing required to move from the current (crisis) quick-reaction to resilience/preparedness approach. Indeed, adequate funding is required during the period of non-crisis to implement many of the solutions presented above, not only for the creation and prepositioning of inputs strategic stockpiles but also for the establishment (and management) of smart Long Term Agreements (LTAs) with key suppliers selected recurring to competition before crises start. In order to establish this new funding model, donors' support would be essential for FAO.

2) Strengthening further FAO's emergency coordination and logistic capacities as precondition for FAO playing a central role in future DL-Emergency Supply Chain and introducing smart technological innovations. In 2020, FAO's senior management has approved a new Organigram that includes the Corporate Logistics and Operational Support Stream. Under this stream Corporate Logistic Services (CSL) have been created. CSL currently includes, among others, the Procurement Service, which is already playing a key active role in emergency supply-chain management. Two separate projects are now ongoing for establishing new Fleet and

[3] Another very useful innovation that this new system could enhance is the introduction of "Graph database" technology, which introduces social media algorithms to supply chains that can reveal supply flows and bottlenecks, true costs, points of vulnerability, contract issues, standards compliance and more. See Supply Management CIPS, March-April 2020, p. 33, "The technology that help Facebook find your friends is coming to your supply chain".

Inventory Management functions. CSL's modernization process seems to be ripe enough to start envisaging equipping the Organization also with a "Shipment, insurance and quality-control unit".

The additional financial resources required to reinforce FAO's supply-chain management capacities, similarly to those required for establishing the DL-emergency stockpiling and global LTAs, should be looked at as an initial investment rather than an additional administrative burden. Indeed, the system, once in place, could quickly become a centre of profits more than a centre of costs. With the external players recurring more and more to FAO DL supply chain solutions for sourcing inputs they require via FAO, the new structure could become quickly financially self-sustainable, similarly to what is happening for other UN agencies already managing similar solutions, like UNICEF, WFP, UNOPS and and ICAO among others. FAO should look at these models also to adapt its policies, as required, so to be able to source inputs and services required against official orders received from its "clients" and receive payments for the same against invoices issued.

3) Develop new models of Private-Public-Partnership (PPP) that may allow, from one side, going beyond traditional sourcing (facilitating win-win solutions for both industry players and recipient governments) and, on the other, defining a better-controlled and transparent collaboration with key suppliers for possible technological innovation.

Technical inputs used for DL survey and control are often capital-intensive and technologically innovative goods (e.g., Drones, GPS devices, ULV spraying apparels, etc.). Industry actors as well as FAO technical experts, especially those in the front line of emergencies, would like to have more opportunities to exchange ideas, experience and information for possible improvements of technical inputs, testing new products organizing official trial sessions. This work may have a significant impact also in terms of risk-reduction of the negative collateral effects that inputs currently used present. As said, FAO is currently not equipped with ad-hoc policy and procedures, and related function, for similar supply-chain oriented collaborations, and this may expose the Organization to the risk of compromising the transparency of future market competition, not to say the creation of future monopoly in an already semi-closed market. The lack of a clear institutional framework, enhancing similar fruitful relationships with commercial entities in absence of conflict of interest, is de-facto limiting FAO's technical knowledge and expertise to take the lead, in a more structured manner, to enhance innovation of DL technical inputs. This is ultimately exposing all concerned stakeholders to the risk of relying on a limited market supply when facing emergencie as well as an exclusively market oriented and short-term for-profit approach to innovation.

When looking at the possible implementation of these three concrete proposals for reinforcing FAO's future role and capacity in managing DL emergency supply chain, coordinating the international actions, it is important to keep in mind the below final considerations:

Desert Locust crises, together with drought, floods and other natural disasters, are likely the oldest causes of famine and starvation known and recorded by civilizations. Any improvement made by FAO in helping concerned governments to face this kind of crises, relying on an integrated supply-chain functioning under the umbrella of the international multilateralism, may have a huge impact on reducing hunger.

DL-emergencies present a level of complexity that make reasonable to expect that supply-chain effective solutions found for this kind of crises may have positive spill-overs, still unknown, useful to respond to other types of agricultural/environmental emergencies, including those caused by worldwide pandemics. These positive effects may limit the major negative effects of crises, such as mass displacements of population, political unrests and economies disruption.

For this reason, all concerned stakeholders should look at the current DL emergency as a not-to-miss opportunity to enhance concrete solutions, and allocate related strategic investments, for an innovative emergency supply chain mechanism centred on FAO's active role within the international community.

Disclaimer: This paper is reflecting my personal opinions on the subject topic and does not represent FAO's official position. I matured these opinions based on my personal experience contributing exclusively to the design and implementation of supply-chain strategies and solutions, in support of FAO's broader response mechanism to several Desert Locust crises in the past 11 years. Of course, there will be a number of extensive reviews, studies, and discussions at the organizational level on lessons learned and future measures at later stage, once the currently ongoing Desert Locust crisis will end, involving various stakeholders, which may end up proving that my current opinions, and especially final recommendations made, need to be revised.