



EXECUTIVE INSIGHTS

Strategies for Strengthening Food Security

Food security is coming under increasing pressure in countries around the world, primarily as a result of climate change but also technological developments, changes in the global trade and regulatory environment, and fluctuating input costs.

With that in mind, L.E.K. Consulting has identified six levers that are being used by countries around the globe to increase their food security, based on four key dimensions of uncertainty for food security:

1. Climate change (from mild to intense)
2. Technological development (from stagnant to fast)
3. Global trade and regulatory environment (from free trade to high barriers/volatility)
4. Input costs (from decline to significant escalation)

1. Climate change (from mild to intense)

In a mild climate change scenario, some countries achieve reductions in emissions, limiting temperature increase to approximately 0.3°C by 2030. Food-producing regions largely remain the same as they are today and the frequency of supply shocks from natural disasters do not accelerate.

But in an intense climate change scenario, countries do not achieve emission reductions and global temperatures rise by approximately 1.2°C by 2030. Food-producing regions around the world — and their crop yields — shift moderately overall, with an increased risk that production declines in certain regions are sudden, negatively impacting global cereal production the most. In this scenario, supply shocks from natural disasters accelerate and price volatility increases, exacerbating the risk of shipping delays and food shortages.

2. Technological development (from stagnant to fast)

In a stagnant technological development scenario, no material changes to crop yields take place (from biotech, seed tech or genetically modified organism [GMO] development), and any changes that do occur fail to completely negate even mild impacts of climate change. Water consumption does not improve, and tolerance for pesticides potentially offsets any technological gains. Global adoption of alternative proteins is low, and aquaculture is unable to meet global demand, which exacerbates food access issues in currently stressed regions.

Conversely — with fast technological change — developments in controlled-environment agriculture, cultured cell technology, plant-based proteins and aquaculture quickly evolve. Production yields materially change, spurred by biotech, seed tech and GMOs, potentially offsetting the impact of intense climate change. Developments in irrigation and greenhouse technology lead to reduced water consumption, and pesticide tolerance is largely a nonfactor. In this scenario, current producing regions are able to continue producing similar crops at similar yields through 2030.

The ability to assess — and monitor — how these uncertainties are unfolding is key to mitigating the risks being brought onto the global food markets, whether you're in government, the enterprise or the investment community.

3. Global trade and regulatory environment (from free trade to high barriers/volatility)

In a free trade scenario, trade remains stable and relatively status quo for most countries around the globe, while trade volumes and prices stay on trend. There are no significant changes to the geopolitical and regulatory environment, and GMO restrictions, carbon taxes, export caps and tariffs are low. Given the current war in Europe, this scenario seems less likely longer term, even if a quick resolution of the conflict were to take place.

In an environment of high trade barriers, protectionism rises, stifling regulations are implemented and volatility grows. Trade and prices fluctuate as a result of geopolitical, logistical and regulatory challenges. Restrictions on GMO, carbon taxes, export caps and

tariffs can be expected. In this scenario, the global food market is less integrated and less able to weather shocks.

4. Input costs (from decline to significant escalation)

Food input costs such as land, fertilizer, feedstock, shipping, labor and water have a significant impact on food price and availability. When food prices are low, consumers in richer countries tend to adopt healthier diets with more fruits and vegetables, and food availability improves in poorer regions.

In a scenario of high global input costs (e.g., fertilizer), the cost of food grows, and consumers are forced to shift their diets to cheaper, and typically unhealthy, foods such as those with more cereals and sugars.

Food security is a global issue, whereby a war or climate event or any other number of developments — be they expected or not — will impact what is available on grocery shelves halfway around the world. It is critical, therefore, that food-focused companies, investors and policymakers understand the key dimensions of food security, both how they've impacted food security so far as well as the full range of ways those dimensions might play out in the future.

The ability to assess — and monitor — how these uncertainties are unfolding is key to mitigating the risks being brought onto the global food markets, whether you're in government, the enterprise or the investment community. To that end, L.E.K. has also created a Food Supply Risk Index based on three key dimensions of food security to monitor, which can be used to aid your decision-making.

The Food Supply Risk Index

L.E.K.'s Food Supply Risk Index, or FSRI, is composed of three components: source, transit and product.

- 1. Source risk** — The supply chain risk from a source country that is driven by any political, economic or environmental uncertainty, including the level of source concentration of its imports, the level of global concentration of its exports, and its level of dependence on imports, or net imports divided by consumption
- 2. Transit risk** — The risk of supply disruption to goods in transit, which is exacerbated by passage through maritime chokepoints
- 3. Product risk** — The risk associated with a specific product, such as limited shelf life, and its relative importance in downstream applications, such as processing, animal feed, etc.

When it comes to source risk, the value of the FSRI for a particular food item grows the more that a given country has to import that item as opposed to producing it. It also grows if the imported items come from just a few sources — especially if there are many other available sources for that item.

The more care a product requires, the higher its risk.

The transit risk level rises if the mode of transportation being used to bring goods into the country has inherent risks — for example, naval shipping routes that pass through chokepoints that can be disrupted by weather events (e.g., storms) or human-driven events (e.g., piracy), or railway routes that run through politically unstable regions (e.g., conflict or terrorism), or unreliable port infrastructure that can experience strikes, delays or other disruptions.

As to product risk, it rises the more care the products require, such as if they are delicate and easily damaged, or if they need to be kept frozen.

How countries manage food security risk

L.E.K. looked at the strategies of countries around the globe and identified six levers that have proven to be the most effective:

- 1. Public investment** — direct or indirect investment in farmland, machinery, infrastructure or logistics, etc.
- 2. Strategic reserves** — stockpiling of grains (for food or feed), seed, or even cold storage
- 3. Incentives/subsidies** — farm/crop insurance, crop price controls, tax incentives for foreign direct investment (FDI), etc.
- 4. Regulations** — source diversification requirements, food waste rules, water conservation regulation, etc.
- 5. Trade deals and partnerships** — regional trade pacts, bilateral trade agreements
- 6. Campaigns** — food waste awareness, water usage campaigns, dietary advice, etc.

These levers are most impactful when enacted in conjunction — as a whole, coherent strategy. Take Singapore. It promotes multiple government programs that support agricultural technology — including in moonshot AgTech (e.g., cell meat) via sovereign funds — and offers them coinvestment opportunities and tax breaks. It has mandated a range of import diversification guidelines and keeps two to three months' worth of stockpiles of key food

staples in case any trade issues arise. It has inked trade agreements with key partners, including those in the private sector, so as to facilitate foreign companies' setting up shop in the country. And it has put in place campaigns to discourage food waste and conserve water to support crop growth.

No two countries/regions have identical food security risks; each country or region needs to tailor its food security risk strategy based on its unique situation.

Singapore is not alone. Using each of the six levers, countries around the world have implemented a wide range of strategies to promote food security, from small countries like Israel, Jordan or Qatar to large countries like Kazakhstan or China. Each country or region will have its specific risk to mitigate: water scarcity, land scarcity, import dependence of specific food items, low purchase power, large population centers with high food demand, etc.; therefore, each situation demands the emphasis of different levers.

Mitigation requires monitoring

Accelerating climate change, advancements in technology, new trade rules and regulations, and ever-fluctuating input costs are causing the state of world food production to change — and with it, the state of global food supply. In the meantime, the global COVID-19 pandemic has shown just how fragile the system is. As such, it is imperative that countries be thinking about food security and investing to prepare for a range of scenarios, be they known or not.

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