TEMPERATURE-CONTROLLED LOGISTICS: *Essential for Health and Growth*

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What Are the Benefits of Temperature-Controlled Logistics (TCL)?

Temperature-Controlled Logistics (TCL) are a key tool for achieving public health goals, realizing economic growth and maintaining reliable nutrition around the world. Individual nations have different TCL needs according to their projected population growth, climates, agricultural harvests and existing infrastructure. Developing nations are currently facing some of the most urgent needs in the TCL sector, especially as they face the challenges of distributing new vaccines on an unprecedented scale.

Helping in Delivery of the Covid-19 Vaccine

Industry leaders estimate that the global distribution of the Covid-19 vaccine will require about 10 billion doses to achieve the desired level for herd immunity. This will in turn require 15,000 delivery flights, 200,000 movements by pallet shippers and 15 million deliveries in cooling boxes over the next two years. Once the vaccines arrive in each country, the respective government will assume responsibility for storage, distribution and administration of the vaccine to the population at large. Most developing countries have significant gaps in the TCL infrastructure needed to maintain the cold chain until the point of inoculation. In many regions, the private sector can make a crucial contribution to vaccine distribution by investing in multi-purpose TCL facilities which can be used for both vaccines and other goods.

According to the World Health Organization (WHO), up to half of all vaccines are wasted, often as a result of temperature fluctuation in transit. Without further investment in cold chain infrastructure, the low temperature handling requirements of the Covid-19 vaccine are likely to result in significant spoilage and wasting of valuable resources that could help in curtailing the pandemic and saving lives. Cold chain logistics for vaccination in developing countries are frequently not at the level required to support a successful immunization program, much less the enormous scale required for effective Covid-19 vaccination. According to the WHO and UNICEF, few low- and lower-middle income countries meet minimum standards for effective vaccine storage, distribution and handling.

Given the significant challenges of developing the deep-freeze storage and transportation networks required for the Pfizer vaccine to remain effective, it can be reasonably expected that most developing countries will opt for other vaccine candidates that can be maintained at standard refrigeration temperatures. These countries will still face a daunting challenge in cold chain infrastructure capacity to deliver the vaccine, especially to isolated rural communities. Some governments and private sector players in India and Latin America have proposed the use of existing private food storage and distribution infrastructure equipment to handle vaccine logistics. These facilities will likely need to be re-purposed and certified by the authorities for use in vaccine storage and handling.

Reducing Food Loss

For most developing countries, the agricultural sector remains critical for development and employment in rural areas. Despite the resource intensity of agricultural production, nearly half of all fruit and vegetables produced globally are wasted every year, according to estimates by the Food and Agriculture Organization of the UN. Food waste is an economic loss for farmers,

leads to higher prices for consumers, and wastes valuable resources like land, water, and energy. Food waste also exacerbates food scarcity. The energy spent on the production of wasted food is a large contributor to greenhouse gas emissions.

In developing countries, the lack of adequate temperature-controlled logistics infrastructure results in enormous food waste. The massive amount of agricultural waste and food loss can be attributed to high fragmentation of agricultural supply chains and the resulting disjointed handling of services. Often, inadequate infrastructure and technology or a lack of skills and knowledge are the problems. In other cases, product exposure to damaging environments or temperatures causes problems. Food loss due to a breakage in the cold chain can occur while the food is stored at a warehouse, or while it is packed or processed. Food loss also happens during distribution and transportation, as well as at the point of sale.

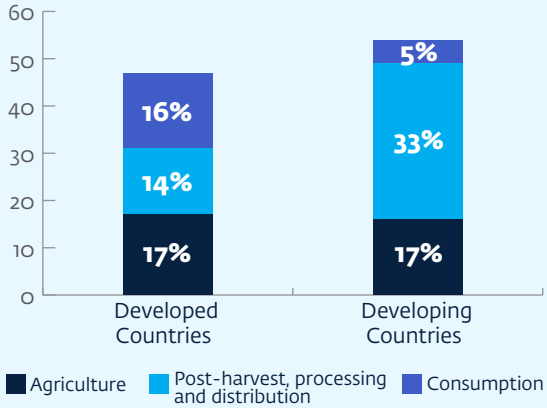
Without TCL, the trade of agricultural products usually takes place in a limited geographic area. Modern cold chain infrastructure allows vendors to sell their harvest much farther afield. Another benefit of TCL use is that farmers are not forced to sell all their crops immediately after harvest but can choose to sell their produce when demand and prices are high. TCL thus contributes to income stabilization for agricultural households. Well-managed TCL can also reduce waste and ultimately make consumer products safer. TCL helps to keep food nutritious as vitamins are best maintained in a cool, stable environment.

Despite the better quality a temperature-controlled environment can provide for fresh products, the high cost of maintaining an optimal cold chain can erode the

45% of fruits and vegetables are wasted every year

In Developing Countries, Fruit is Lost Before You Even Buy It

(percentage of total fruit and vegetable prodution lost or wasted)



competitiveness of the products because consumers in emerging markets are often not willing or able to pay a premium for such products. Sustainable investments in cold chain requires a diverse mix of value-added products to anchor the investment and guarantee a certain level of asset utilization.

The Benefits of Specialized Temperature-Controlled Logistic Services

In countries with insufficient third-party TCL supply, many companies have established their own captive TCL infrastructure and systems. For example, in Nigeria, nearly all TCL activities are carried out in-house, due to lack of investments by credible third-party service providers in multi-user facilities. This has the advantage that each company can tailor its TCL system to its own needs, but the in-house system has a high cost. Third-party TCL services can bring about increased efficiencies, better reliability and service quality and generate additional value for all industries requiring cold chain, including the food and pharmaceutical industries. The development of these services is particularly important at a time when cold chain infrastructure can help address fundamental development challenges such as food security, climate change and Covid-19 response. Specifically, third-party TCL services offer important advantages that can only be achieved through specialization:

Keeping Mangoes Fresh

Once a mango has been harvested, it remains in good quality for approximately five days. In Myanmar, a mango is typically brought by small trucks from a rural farm to Mandalay. In the city, it is transshipped to bigger trucks and transported to the auction center at the Chinese border. This process takes about 36 hours. By the time mangoes are sold to Chinese traders, cleared by customs on both sides of the border and delivered to the trader's truck or warehouse, another day has passed. The transport from the border to Kunming, a major regional market some 700 km away, where the mango is sold in supermarkets, takes an additional two days. By the time it is sold, the once-juicy mango is past its prime, and commands a lower price than it might have done if TCL practices were optimized.

That same mango can be easily kept in peak condition for 10-15 days if the fruit remains at a constant temperature of 5-10°C after harvesting. In Thailand, where supply chains are well-integrated and TCL management is part of the process of bringing the fruit to market, the initial sale takes place in the mango-growing area. The only time the container is opened is when the shipment is manually transloaded at the Chinese border. The whole process from farm to Kunming takes approximately 4-5 days. Since the mango is cooled most of the time, the mango remains fresh for another 5-10 days before it begins to deteriorate.

- *Operational costs optimization:* Third-party services can pool demand from various sources and thereby realize economies of scale and balance seasonal fluctuations.
- *Strategic focus:* Producers and manufacturers can focus on their core business and purchase TCL services flexibly at variable costs.
- *Access to specialists:* Third-party TCL service providers can more easily introduce service quality improvements provided by external specialists.
- *Increased flexibility:* Third-party providers respond faster to changing market conditions and have better access to technological innovations.
- *Risk diversification:* By engaging third-party services, producers and manufacturers do not need to take on the risk of capital expenditure or investments in physical assets.

When it comes to vaccine logistics, some countries have outsourced the management of vaccine supply chain and logistics to specialized private-sector entities. The typical benefits sought through outsourcing include lowering costs, conserving constrained public resources, increasing efficiency and better focus of government efforts on planning and policy formulation. Some governments have opted to lease refrigerated trucks and storage from the private sector as a short-term measure to meet shortfalls in vehicle availability. A **study** conducted by the WHO found that the outsourcing of vaccine logistics to specialized private entities through public-private partnerships brought about important benefits in terms of quality and costs in Thailand and in the Western Cape Province of South Africa. The South African and Thai programs reported outsourced supply chain costs of 6% and 5% of the cost of the vaccine compared to 28% and 31% for in-house supply chain, respectively.

A series of notes on new investment opportunities in Temperature-Controlled Logistics

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