Feature by Liesl Venter and Ed Richardson

Growth outpaces infrastructure development

Lack of investment in infrastructure and resources continues to impact the cold chain across Africa, posing a challenge to the perishable and pharmaceutical industries on the continent.

According to Vijan Chetty, treasurer of the Cold Chain Association (CCA), South Africa is a notable exception, with strategically positioned airports and seaports. However, the growth in imports and exports is rapidly outpacing infrastructure development within South Africa.

"There are 33 countries in Africa classified as least developed countries. Many of these nations have limited sea, road, rail, and air infrastructure, hindering the efficient and effective transport of perishable and pharmaceutical products both within the country and to international markets," he said. "Some of these countries have pockets of excellence and success stories. The biggest challenge across Africa, however, is the investment in infrastructure and resources. A lack of reliable electricity supply further disrupts the cold chain. This shortage has forced many cold storage facilities to install diesel generators, which are costly and not environmentally friendly."

According to Chetty, demand is increasing and delivering capacity is critical. "There is a distinct growth in Africa, especially South Africa, in perishable agricultural produce. South Africa is the second-largest exporter of citrus fruit in the world," he told *Freight News*.

At present, only Spain exports more citrus than South Africa. The country is also a leading exporter of apples, while Kenya is in the top five flower-producing countries in the world.

"Agricultural growth in Africa is increasing year-on-year," said Stavros Evangelakakis, CCA chairman of the board. "Maintaining capacity for sea freight and airfreight is crucial. Any reduction in capacity negatively impacts the growth of commodities."

> "Addressing electricity challenges remains critical for the cold chain in Africa.
>
> – Vijan Chetty

Chetty emphasised the rising importance of the cold chain alongside quality and phytosanitary compliance for agricultural produce. "Greater focus is being placed on cold chain management, including cold storage, packaging, transportation, and infrastructure," he said.

Addressing electricity challenges remains critical for the cold chain in Africa. "Africa relies heavily on electricity and gases for refrigeration. Local legislation compliance is the minimum requirement and does not always ensure sustainability. More investment is needed in basic resources, such as electricity, to reduce reliance on diesel generators."

He added that cold storage facilities must explore more environmentally friendly methods, particularly those that do not always require significant investments.

Evangelakakis said it was not possible to isolate one element of the cold chain; instead, the entire supply chain must be considered. "The journey starts from the shipper and ends at the supermarket. This is where the industry needs to work together, collaborate, and develop solutions."

Greening the cold chain

Researchers from the Columbia Climate School have identified the steps and technology of the cold chain which increase the carbon footprint of fresh produce.

Benjamin Ritter, Carolyne Barker and Kevin Karl say "refrigerators, industrial chillers, and transportation have significant potential impacts on climate change, from massive energy demands to powerful fluorinated greenhouse gas emissions".

They estimate that global food system refrigeration is responsible for up to 5% of global energy needs and 2.5% of total greenhouse gas emissions.

"Rising global temperatures and emerging economies will continue to drive demand for massive new cold chain infrastructures," they predict.

More efficient global cold chains are needed to reduce the approximately 144 million tons of annual food loss in developing countries alone.

Globally, food loss and waste account for nearly 4.4 gigatons of carbon dioxide emissions a year.

Reducing waste comes with an emissions trade-off – air chillers, refrigerated trucks, reefers and cold stores all consume energy which, if supplied through the burning of fossil fuels, adds to the carbon footprint of fresh produce.

In addition, fluorinated gases (F-gases) used as refrigerants are leaked into the atmosphere.

They are up to 25 000 times more damaging as greenhouse gases than the equivalent carbon emissions.

Global food cold chain energy consumption and F-gas emissions are responsible for about 3.5% of the world's carbon footprint, they estimate.

The Africa Centre of Excellence for Sustainable Cooling and Cold-Chain (Aces) is one of the organisations tackling the challenge.

Aces plans to commission Africa's first environment test chamber in Rwanda by the end of 2024.

It will enable the testing and certification of equipment tailored to African needs, according to Professor Toby Peters, director, Centre for Sustainable Cooling University of Birmingham and Heriot-Watt University.

Global food loss in developing countries alone is estimated at 144 million tons per year.

"Simultaneously, in Kenya, we will launch the community outreach programmes in spring 2024, including allowing farmers to trial technology before making investments.

"All of these will be underpinned with a strong cohort of trained trainers and technicians," he writes in the March 2024 Aces Review.

"With the world's first cold-chain and cooling institute, with its own campus and outreach SPOKEs being established in Africa, we now have the frontline capability to accelerate a resilient, sustainable, and inclusive transformation on a systemic level," he writes.

SPOKEs (specialised outreach and knowledge establishments) will share research, innovation and knowledge in different markets through a hub and spoke model.

Funding is being provided by the UK government.

Reefers open for non-reefer cargo

Inbound empty reefers provide thousands of opportunities for the shipping of "reefer-friendly" cargo, says logistics consultant Andy Connell.

"Some 85% of reefer containers arrive empty in South Africa, with only 15% containing-paying cargo," he told *Freight News*.

"This represents a very poorly tapped market for reefer-friendly cargo."

Included in this category would be cargo which does not leave a residue, such as electronic components, television sets, and clothing.

Car tyres and paint would not be suitable.

Connell was commenting on the DHL Global Forwarding Ocean Reefer Market update for Q2, 2024, which estimates that southern Africa will have an annual imbalance of 23 000 forty-foot equivalent units, or 91%.

There are similar imbalances in the Asian, Oceania, South and Central American markets.

The report also states that "reefer shipping returns to crisis mode".

"Following a period of eased capacities and rates in the previous year, challenges for fresh goods in maritime transport are resurfacing," according to DHL.

The challenges include water shortages in the Panama Canal as a result of climate change and the Gaza conflict.

The rerouting of vessels from the Suez Canal to the Cape increases time and cost, and contributes to a shortage of containers as they are spending longer in transit.

Other factors impacting demand for protein include weakness in the Chinese economy and reduced spending power of consumers in both emerging and industrialised markets.

According to DHL, global meat volumes increased by 1.1% year-on-year during the second quarter, while fish and seafood shipments declined by 0.8%.


GROWING CONDITIONS VARY
BUT NOT OUR COLD STORAGE

Farm-to-table trials identify challenges

The Cold Chain Association (CCA) is continuing its research on trade lanes for various types of produce to improve the cool chain, says Vijan Chetty, CCA treasurer.

Several of these trials have been conducted on routes from South Africa to Europe.

Partnering with the Perishable Products Export Control Board (PPECB), one study tracked cut flower exports from South Africa to Europe to highlight risk areas affecting vase life. Conducted in collaboration with Arnelia Farms, a South African wholesale flower nursery and exporter, and tracking Sunshine Conebush flower consignments packed on-farm near Hopefield in the Western Cape province of South Africa to destinations in the Netherlands and Germany, the trials aim to establish challenges and to make recommendations relating to the cool chain.

Another trial followed the transport of raspberries from Haygrove Heaven Farm in Cape Town to their export destination in the United Kingdom.

Chetty said several factors were assessed, including the quality of raspberries on the farm, temperature management throughout the trade lane, handling processes, and a final quality evaluation on arrival at the end destination.

According to Chetty, many trials over the past few years have primarily focused on the final mile of specific trade lanes. "Having signed a memorandum of understanding with the PPECB, the CCA has significantly extended these trials to encompass the entire journey from farm to table," he said. "We are not only monitoring the temperature of the product but also aiming to identify all factors that could influence shelf life. This includes post-harvest practices, packaging and palletisation, and the functionality of cold storage."

> “We are not only monitoring the temperature of the product but also aiming to identify all factors that could influence shelf life.
> – **Vijan Chetty**

He said recent research focusing on air exports from South Africa found that the carton designs used for transporting certain commodities lacked proper ventilation holes and were not correctly aligned, thereby hindering adequate airflow and cooling of the produce. “In response, the CCA has recommended improving carton designs to ensure proper ventilation for effective cooling. The industry is increasingly recognising the importance of proper cooling methods, such as using a combination of ice packs, dry ice, and thermal blankets, to enhance effectiveness in airfreight.”

Ongoing research from farm to table on various types of produce is enhancing cold chains worldwide.

The CCA has also released a best practice video for handling perishables from the findings of its raspberry and cut-flower field-to-market trials with the PPECB.

The educational video presents learnings from the two trials and advises optimal handling procedures to protect product integrity and maximise shelf life.

It explores various stages of the perishables chain, highlighting good agricultural practices, requirements surrounding fresh air ventilation and taint, and recommendations for thermal protection of perishable products, including cartons, packaging, and labelling. The guidance also covers optimal aircraft loading and transport procedures, and cold storage and pre-cooling of perishable products, offering advice on specific temperatures found to be optimal during trials.

“We have taken the results and put them into a practical format to enable the entire industry to benefit from these learnings,” said Chetty. “By adopting these optimal practices, the industry can hope to address the vast waste that occurs in the perishables supply chain.”

According to Chetty, following the success of the trials, the CCA believes further research and trials are called for.

Climate change impacting quality and volumes

Climate change is affecting shipping volumes of fruit and vegetables, with the DHL Global Ocean Reefer Market Update for the second quarter of 2024 recording declines in bananas, berries and citrus.

The banana trade was down 1.3% year-on-year, melons and berries by 6.8% due to poor harvests in South America, and citrus by 3.1%.

South Africa is also feeling the impact of climate change.

"Due to the interdependence of fruit production on climate, it is inevitable that climate change will affect fruit and vegetable production and quality," according to Cyril Julius, general manager: coastal at the Perishable Products Export Control Board (PPECB).

"Similar to the rest of the world, South Africa is experiencing increases in average annual air temperature and changes in precipitation trends.

"These experienced changes are projected to continue and intensify at alarming rates should factors causing climate change remain unresolved," he writes.

The National Climate Change Information System, which falls under the Department of Forestry, Fisheries and the Environment, predicts that temperature increases of more than 4°C are likely over the entire South African interior from 2080-2099, going up to over 6°C in the western, central and northern parts of the country.

Together with more frequent heatwaves, there will be "potentially devastating impacts on agriculture, water security, biodiversity and human health".

A PPECB study to determine the impact of climate change on the quality of fruit and vegetables in Limpopo, Western Cape and Eastern Cape confirmed that climate change influences fruit and vegetable production and quality.

> "A crop which may benefit from climate change is potatoes, with Potatoes South Africa projecting an increase in production.

With warmer and drier conditions, apples and plums tend to mature faster.

Fruit was found to be severely affected by sunburn, which could result in higher out-of-grade fruit and thus poor farm profitability, he says.

Citrus was affected by increased rind under warmer and drier conditions.

However, climate change may have a positive effect on the quality of the fruit.

The incidence of decay and waste was seen to decrease in hot and dry conditions.

A crop which may benefit from climate change is potatoes, with Potatoes South Africa projecting an increase in production.

Freight News was also told that new blueberry cultivars will see South Africa producing year-round.

The season for lemons and grapefruit has also been extended by global warming.

Farmers are adapting by erecting shade netting, investing in advanced or climate-smart agriculture production techniques, as well as degreening to improve fruit colour.

Shipping lines want to control full logistics chain

A move by shipping companies to control the full reefer logistics chain from farm to final destination aims to improve the quality of fruit and reduce wastage, believes logistics consultant Andy Connell.

"It is crazy to use reefers only for port-to-port transport.

"What you have is a mobile warehouse that is also a refrigeration unit. You want it as close as possible to the point of production where it can be packed and kept under hermetically sealed conditions. This is already finding traction.

"They should only come off power when they reach their destination," he told *Freight News*.

By building chilled cross-dock facilities close to the main growing areas, shipping lines are also taking greater control of the movement of containers, which should help reduce equipment shortages, he adds.

"This means that perishable products are locked into the cold chain a good two to ten days earlier than moving through quayside chilled cross-dock facilities."

The lines are able to offer a true door-to-door service, with the customer receiving a single invoice for the packing, transport and shipping.

"This gives both the producer and customer peace of mind. As a shipper you just seal the container and get paid 30 days later when it arrives at your customer's door."

> Where consignment composition permits, containers should be loaded on the farm, where cooling can start as soon as possible after picking.
> – Andy Connell

Where consignment composition permits, containers should be loaded on the farm, where cooling can start as soon as possible after picking.

This means it will be at the right temperature when it gets to the stack.

"You do not want to handle a perishable product more than you have to.

"If you tightly pack a container, the produce will come out standing to attention at the other side.

"Pallets of product may (and do) get damaged when there are multiple third-party handlers such as in traditional cold stores.

"There are also delays, which further affect the condition of the produce."

For markets where pre-cooling is required, the cold stores are equipped with cross-docking to reduce the time between picking and cooling.

"The goal should be to have the produce in the port in less than six days after picking."

Another advantage of packing the produce in a container as soon as possible is that it can then be registered on the port Navis system.

"It is like checking in early for a flight – you are guaranteed your spot," he says.

"There is a huge advantage to the shipper once the container is registered in Navis as the vessel will not leave without you.

"Early registration also earns business cred with the port and shipping lines, which means they will be more willing to accommodate you in future."

Cold chain logistics still too complicated for AI

Artificial intelligence (AI) will not replace seasoned professionals in cold chain logistics any time soon, according to Quintin Botha, strategic partnership lead at CtrlFleet.

"The jury is still out on the leap to a cognitive AI solution that can solve real-time problems while navigating the complexities of a global or, for that matter, local supply chain," he told *Freight News*.

People need to talk to people to keep freight moving.

"As we anticipate the emergence of cognitive solutions and their potential impact, it's important to note that technology connecting supply chains requires collaboration.

"Strategic partnerships are pivotal in enabling the exploration of advanced technologies and finding the balance between supply chain transparency and potential regulatory constraints.

"The GCCA (Global Cold Chain Alliance) provides a platform for various stakeholders to collaborate and develop frameworks for the global adoption of transparency.

"The collaboration will be critical for generating and adapting cognitive models that could automate complex problem-solving in global cold chain progression and congregate automation, visibility, and sustainability," he said.

Technology is impacting the cold chain logistics landscape in other ways.

"One of the most exciting advancements in the cold chain industry is the increased visibility through real-time monitoring.

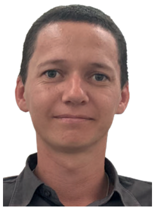
"This technology empowers operations teams to react swiftly to temperature changes and predict potential issues before they escalate into a waste event, significantly improving operational efficiency," he said.

Volumes at Beira trending upwards

Cold chain volumes in southern Africa are rising as capacity improves and the sector attracts more investment.

According to Marco Grobbelaar, general manager at Independent Beira Logistics Terminals and Services (IBLT&S), the Beira corridor, in particular, is experiencing an increase in volumes. Factors such as its competitive landside operations and ocean freight rates compared to surrounding ports are contributing to this growth. Additionally, the import volumes of fertilisers and the expectations surrounding them play a significant role.

"IBLT&S now offers 30 reefer connection points, with two dedicated areas in our expansive 130 000m² yard for these operations. Currently, our focus is on handling frozen imports destined for Zambia and the Democratic Republic of the Congo," he said. "Regarding exports, our emphasis lies in providing seasonal supply chain solutions to customers, particularly for citrus, avocado, and similar products. This includes ocean freight logistics, where products are either transported in ambient conditions to Beira for packing, monitoring, clearance, and export, or packed in reefers at the farm, transported to Beira, stored, cross-packed at IBLT&S, and then exported."



> Currently, our focus is on handling frozen imports destined for Zambia and the Democratic Republic of the Congo.
>
> – Marco Grobbelaar

He said the biggest challenge was still equipment availability. "There is still a shortage of controlled atmosphere (CA) containers for said products," he said, indicating that despite increased investment, more was still needed.

The United States International Trade Administration reiterates this, finding that Mozambique's underdeveloped cold chain infrastructure compounds issues around food waste and food security, leading to a loss of market opportunities. "There is a significant need for the development and implementation of cold chain logistics to enhance maintenance, transportation, storage, and handling, together with training and management in standards and best practices," reads a report on the agricultural sector.

Grobbelaar said there were numerous opportunities for increased volumes for Mozambique, despite the challenges.

"The country offers shorter transit times to the Middle East, which is a rapidly growing market for agricultural products," he said. "Specifically for Beira, there is an opportunity to further develop as a potential hub for cold chain movements. This is due to its proximity to major agricultural export regions in the hinterland, resulting in shorter inland transit times from farms to the port."

He also noted that new shipping line services, such as Unifeeder calling at Beira port, contributed to competitive ocean freight rates.

"The potential restrictions of bans of certain cold chain products into and out of other ports is benefiting Mozambique, which is very accommodating, providing the necessary inspections and permits are in place."

Grobbelaar said that, in light of this, they were highly optimistic about their outlook for cold chain products.

"We are very optimistic about the growth we've seen and expect further increase in demand."

Breeding cattle beefing up Botswana's exports

Working with the US Department of Foreign Agricultural Service based in Pretoria and other international bodies, the government of Botswana is trying to regain lost beef export volumes.

At present its biggest market is Norway.

Pierre du Plessis from the University of Oslo says Botswana and Namibia have a duty-free quota of 2 700 tons of boneless beef exports to Norway this year.

Despite the demand for grass-fed beef, there has been a decline in the national herd from an estimated 2.2 million head in 2004 to 1.7m.

"The development of a modern cattle farming and slaughter industry (and the corresponding development of a market for US feedstocks, ingredients, and technology) is limited by the government's monopoly on meat processing plants, exports, livestock prices as well as outbreaks of foot and mouth disease, especially in the north-eastern part of the country," according to the department.

In May 2023, the government of Botswana received a consignment of 162 breeding cattle from the United States which will be used to improve the local genetics.

In addition, a R256m multi-species abattoir is expected to be commissioned this year still, according to Fidelis Molao, Botswana's minister of agriculture. The abattoir is operated by the Botswana Meat Commission.

PPECB is SA's competitive advantage

The support provided by the independent Perishable Products Export Control Board (PPECB) gives South African growers a competitive advantage in the world market, according to logistics consultant Andy Connell.

> Quite a few European countries are not happy about SA exporters exporting to Russia.
> – **Andy Connell**

Speaking about new and existing markets for South African produce, he told *Freight News* that "there is no doubt that they want our fruit, because of the product quality and the controls that South Africa has in place through the PPECB".

SA is the only supply country with a body such as the PPECB, he says.

"The PPECB makes sure that every container that leaves SA is both product worthy and cargo worthy and that the cold chain is strictly controlled."

They ensure that containers are not contaminated by previous loads, which can leave pears tasting like onions after spending time in a container previously used for onions, he explains.

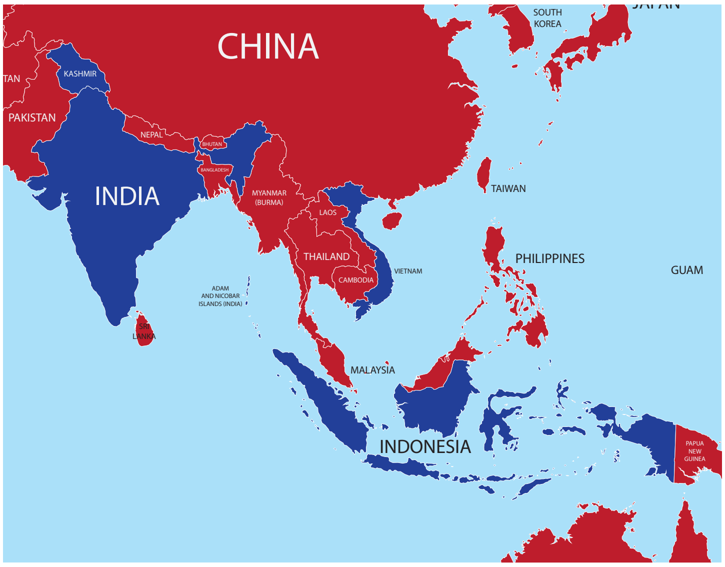
Shipping lines are playing their part by thoroughly cleaning the containers and conducting pre-trip inspections before delivering them.

This gives SA exporters the "right business credibility with customers, who know that we have the checks and balances in place to ensure that they get what they want".

Connell says South African exporters are actively exploring markets to the east, such as India, Taiwan, Vietnam and Indonesia.

Access to these markets is being opened through diplomatic channels by the Department of International Relations and Cooperation and Department of Trade Industry and Competition, together with the Department of Agriculture and the fruit industry bodies.

He cautions about geopolitical challenges with Russia because "quite a few European countries are saying to SA exporters that we are not happy with your exporting to Russia".



South African perishable exporters are actively exploring markets to the east.