



Agroindustry Policy brief

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Developing the cold chain in the agrifood sector in sub-Saharan Africa

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Introduction

This policy brief is based on the proceedings of the **Regional workshop on the use of the cold chain in the development of agriculture and agro-industries in sub-Saharan Africa**, organized in Yaoundé (Cameroon) in June 2012. The workshop brought together speakers from diverse backgrounds to analyse findings from case studies conducted in food supply chains that included meat, fruits and vegetables, fish and seafood, milk and dairy products.

Significance of the problem

The lack of reliable and adequate cold chain facilities in sub-Saharan Africa is one of the main causes of losses of perishable products, which are estimated to be about 25–30 percent for animal products and 40–50 percent for roots, tubers, fruits and vegetables (FAO, 2011). These losses result not only in a deterioration of food security in all its dimensions, but also in loss of market opportunities, waste of the scarce resources (water, land and energy) devoted to producing the foodstuffs, and a significant ecological footprint. Reliable and efficient cold chains contribute not only to reducing these losses, but also to improving the technical and operational efficiency of the food supply chain. Cold chains thus facilitate compliance with quality and safety requirements and promote market growth,

Key messages

- Development of the cold chain facilitates food loss reduction, helps meet market requirements for quality and safety, and improves food production and food security.
- Development of the cold chain must be guided by a master plan, which should be integrated into multi-sector and multi-stakeholder development strategies that foster cooperation within the value chain and public-private and private-private partnerships.
- A regional/subregional vision of development of the cold chain in sub-Saharan Africa, which adopts a complementary approach and takes into consideration economies of scale, is also recommended.
- Governments and the private sector must promote the emergence of cold chain-based commodity associations and similar groupings that can serve as information and training channels while fostering the implementation of shared actions by the various stakeholders.

stimulating increases in production (IIR, 2009b). Development of the cold chain can therefore be considered a necessary step towards achieving food and nutrition security. In spite of this need, however, cold chain development has not received the necessary attention from governments and development organizations and therefore remains underused in comparison with the actual and potential needs of sub-Saharan Africa.

The current status of cold chains in sub-Saharan Africa

The reports on the status of cold chains that were presented by workshop participants from 16 countries show that cold chains are currently very poorly devel-



TABLE 1 Comparison of the cold storage capacity per capita in selected sub-Saharan African countries

	Ethiopia	United Republic of Tanzania	Namibia	South Africa
Capacity (litres/capita in urban areas)	2	2	5.1	15

Source: IARW, 2012.

Note: Data are for 2012, except for South Africa, for which 2008 data are shown.

TABLE 2 Production of perishable foodstuffs in sub-Saharan Africa in 2010, and average annual growth in production in 2000–2010

	Fruits	Vegetables	Roots and tubers	Meat	Milk	Fish (capture and aquaculture)	Total production and average rate
Production (thousand tonnes/year)	72 063	33 802	225 494	11 332	24 000	6 140	372 831
Annual growth 2000–2010 (%)	3.8%	3.7%	3.6%	3.8%	4.6%	11.9%	5.2%

Source: FAO, 2013.

oped or inexistent in most subsectors in sub-Saharan Africa, with the exception of some export-oriented chains targeting markets that are considered profitable. The International Institute of Refrigeration (IIR, 2009b) estimates that in developed countries (where 70 percent of the population is urban) cold storage capacity in urban areas is about 200 litres per capita, while in developing countries (where 50 percent of the population is urban) it is about 19 litres per capita. In emerging economies such as China, cold storage capacity is somewhere between these two levels. More precise but sparse data exist for some sub-Saharan African countries illustrating this situation very well (Table 1).

Causes of the current situation

Value chain actors who are considering investing in cold chain development in sub-Saharan Africa face challenges related to: i) access to energy; ii) maintenance (shortage of qualified staff and spare parts); iii) poor logistics arrangements; iv) weak organization and implementation of controls for compliance with standards; and v) relatively low traded volumes and weak organizational arrangements for value chain activities.

Promising prospects

Despite these challenges, economic and demographic trends in sub-Saharan Africa, including a growing middle class and increasing urbanization, offer sig-

Freshly harvested carp from a fish pond



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nificant opportunities for reaching more rapidly the “critical mass” needed for cold chain market development in the region. Regional production of perishable foodstuffs, which was about 373 million tonnes in 2010, is expected to increase during the current decade at a rate that reaches or exceeds the annual 5 percent growth of the previous decade (Table 2).

Strategies for cold chain development

i. Integrating cold chains into agricultural and food-security development strategies more effectively

Food losses increase differences in prices between producers and consumers. Lack of a reliable and



adequate cold chain limits marketing opportunities, hampers the development of production, and reduces the accessibility of products for consumers and the profitability for producers. Development of cold chain logistics should therefore be an essential element in overall strategies for agricultural development and food and nutrition security.

2. Preparing multi-sector and multi-stakeholder strategies

The cost of a reliable cold chain is not economically sustainable unless production reaches a threshold in terms of volume and quality of products. Cold chains are also highly reliant on equipment maintenance, which requires qualified staff. However, the provision of training is feasible only when there are sufficient operating systems to justify investments in training and to ensure long-term employment. These two requirements show that cold chains need to be integrated into multi-sector and multi-stakeholder (agriculture, logistics, training, research and development, monitoring, etc.) development strategies, thereby encouraging cooperation within the value chain, and public–private partnerships. Such strategies must be based on shared understanding of the situations and common objectives of both public- and private-sector actors, and must be clearly formulated and jointly implemented.

3. Adapting intervention strategies to the specific needs and features of products and to geographic and socio-economic conditions

The nature and impact of constraints to cold chain development differ, depending on:

- the subsector/value chain involved – meat, fruits and vegetables, fish and seafood, milk and dairy products, etc.;
- the region – climate, electricity network, transportation infrastructure, distances from markets, purchasing power, economic and social organization, food habits, etc.

Although the main characteristics of an effective cold chain are generally the same, the development strategies and pathways towards establishing a cold chain should be adapted to this diversity and to the capacities of private and public stakeholders to make improvements and take action.

4. Carrying out preliminary studies prior to any refrigeration equipment project

Choosing among different types of equipment requires significant investments of effort and economic resources, justifying careful decision-making.

BOX 1 To bear in mind

- Equipment and energy efficiency (IIR, 2003): Cooling products and keeping them at low temperatures costs more in hot climates than in temperate ones. Any factor that can contribute to energy efficiency is particularly important in sub-Saharan Africa: choice of suitable systems, use of good practices (maintenance, defrosting, door closing, merchandise flow management, cold store loading), selection of vehicle colour (as light as possible), checking and improving insulation, etc.
- Solar-powered cooling requires high initial investments (FAO and IIR, 2014) but provides an interesting alternative in the absence of an electricity network. In other situations, depending on the climate and the price of energy, cold storage and evaporative cooling may represent the most economical option.
- For transport, in the absence of refrigerated vehicles, insulated vehicles can be used for some routes, preferably with eutectic plates, which have high thermal inertia that delays warming of the load (IIR, 2009a).
- Any option for reducing losses should be taken into consideration (IIR, 2009).

BOX 2 Definitions and general principles of operation of a cold chain

- The cold chain is the set of resources used to achieve and maintain temperatures that preserve the quality of products throughout their shelf-lives, from production to consumption. Essential links in the cold chain include production, transportation, storage, distribution (delivery, temporary storage, display and selling) and related aspects, including preservation at the consumer level.
- The basic principles for using refrigeration to preserve perishables can be summarized as the “three pillars of refrigeration”: having healthy products; bringing products into the cold environment as quickly as possible; and maintaining continuous cooling, which can be monitored with temperature sensors.
- Cooling is an efficient way of preserving perishables, but it does not improve the quality of foodstuffs; close attention should always be given to factors other than temperature that contribute to deterioration in quality and increase losses.
- The reliability and efficiency of a cold chain depend not only on the quality, maintenance and management of equipment, but also on the control of critical points in the cold chain at the interfaces between various stages. Where relevant, designation of these responsibilities through contracts can help ensure progress.
- Regulations, standards and good practice manuals should help by recommending, for example, rapid loading and unloading of vehicles, enclosed and air-conditioned loading platforms, insulated bags for consumers, etc.

Fresh meat being frozen



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Recommendations

For governments and other public authorities

Governance:

- Prepare and implement a strategic cold chain development plan in partnership with the private sector. The plan should be consistent with other sectoral development plans, such as those for agriculture, infrastructure, agro-industry, distribution and training.
- Define quality regulations and standards, particularly in relation to food safety and environmental sustainability.
- Monitor the application of standards and regulations through effective compliance control, to protect public health and ensure the confidence of consumers and value chain stakeholders.

Training and research and development:

- Support vocational training institutions in all concerned sectors, particularly those related to logistics, maintenance, engineering and the operation of refrigeration equipment.
- Facilitate the transfer of technologies to strengthen local capacities.
- Support research and development efforts that respond to sub-Saharan Africa's specific needs and strengths (e.g. solar energy) by ensuring that national and regional authorities play complementary roles.

Investments:

- Upgrade key infrastructure and related services (electricity, transport, markets, etc.) to ensure that cold chain systems are effectively implemented and efficient.
- Design and put in place incentives to promote investment and capacity building in key agrifood subsectors – support for land acquisition, private-public partnerships, etc.

For the private sector

- Promote the establishment of commodity and other private-sector associations around the cold chain, and actively participate in their functioning; these organizations can serve as good information and training channels.
- Foster dialogue among value chain actors to develop a shared vision of needs and markets.
- Learn how to spend wisely and save money through feasibility studies before purchasing equipment; “preventive” maintenance; optimizing transportation, storage and handling conditions; compliance with standards and good practices, etc.
- Participate in vocational training and foster awareness-raising and continuous training of the personnel of private-sector enterprises.

Conclusion

The development of cold chains in sub-Saharan Africa will result mainly in reduced food losses and improved market access, encouraging agricultural production and stable food security. In order to address the challenges and meet the priority needs for refrigeration in different agrifood subsectors, governments and other stakeholders, particularly in the private sector, must address issues in the following priority areas: i) governance; ii) basic infrastructure; iii) technology transfer, research and development; iv) training and professionalization in the agrifood sector; and v) professional organizations and stakeholder dialogue on cold chain development.

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