

Rural transport of food products in Latin America and the Caribbean

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Cover photograph:

Transfer of agricultural products from farmer to buyer, Guatemala.
Leonardo F. De León/Guatemala.

Rural transport of food products in Latin America and the Caribbean

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Foreword

Transportation is fundamental for the development of human activities, especially production and trade-related activities, including the production and trade of agricultural products. The swiftness and cleanliness of transport have a direct impact on food availability, given the special nature of food of agricultural origin, which is always to some extent perishable. Sanitation, food safety and the economy in general all come into play here, especially the cost structure of the supply chains and the final price of food products.

All countries face serious logistical problems, depending on their climatic conditions and the lay of their lands. They use the most disparate means available to transport their goods – which may be shouldered by people, carried on muleback or in vehicles of all sizes and shapes pulled by people, or animals or perhaps engine-drawn. Goods may be moved by road, rail, air or ship – all to reach the end consumer on time and in good condition. There are regions, however, populated by millions of people (usually the poorest people), where transport problems are especially acute. In large areas of the world, transport problems keep people in isolation, with very little chance to develop and to better their lot in life. These difficulties are often why people remain isolated and unable to meet their most basic needs for food, education and health.

Even more importantly, the direct factors involved in transport are not independent: they involve a whole series of closely related activities. These include the storage, processing, industrialization and distribution of food products, all of which give rise to a great volume of activities and demands for infrastructure, thus generating jobs in parts of the world often sidelined, and where unemployment is very high.

This document presents case studies drawn from 17 countries of Latin America and the Caribbean. Duly adjusted and adapted, they may also be useful for an interpretation of transportation problems in other parts of the world. The study covers the region of Central America and Panama (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama), the Expanded MERCOSUR countries (Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay), and the Andean Pact countries (Bolivia, Colombia, Ecuador, Peru and Venezuela). One country from each of these three regions is also reviewed in detail.

FAO's Agricultural and Food Engineering Technologies Service (AGST) of the Rural Infrastructure and Agro-Industries Division believes that the search for solutions to these problems deserves due consideration and support. This complex productive network has great impact on a country's economic efficiency, and on its GDP. It is unquestionably FAO's duty to offer its member countries information and opportunities for technical assistance in these disciplines, which are so fundamental to the social and economic development of their populations.

Acronyms and abbreviations

ALADI	Latin American Integration Association
ALCA	Central American Free Trade Association
ADC	Andean Development Corporation
ACN	Andean Community of Nations
CACIA	Costa Rican Chamber of the Food Industry
CACM	Central American Common Market
CENMA	Central Wholesale Market (Guatemala)
COMITRAN	Commission of Ministers of Transport
CORPOICA	Colombian Corporation for Agricultural Research
EAP	Economically active population
ECLAC	Economic Commission for Latin America and the Caribbean
FONAPAZ	National Peace Fund
FONPLATA	Financial Fund for the Development of the River Plate Basin
GDP	Gross Domestic Product
GFP	Good Farming Practices
GMP	Good Management Practices
HACCP	Hazard Analysis and Critical Control Point
IBTA	Bolivian Institute of Agricultural Technology
IFAD	International Fund for Agricultural Development
IICA	Inter-American Institute for Cooperation in Agriculture
ILO	International Labour Organization
INCAE	Central American Institute of Business Administration
INDDA	Agroindustrial Development Institute
INDEC	National Institute of Statistics and the Census (Argentina)
INDECORI	Institute of Industrial Research and Technical Standards
INEI	National Institute of Statistics and Informatics (Peru)
INIA	National Institute of Agricultural Research (Peru)
INIA	National Institute of Agricultural Research (Venezuela)
INIAP	National Institute of Agricultural Research (Ecuador)
INTA	National Institute of Agricultural Technology (Argentina)
ITDG	International Technology Development Group (Peru)
MAGA	Ministry of Agriculture, Livestock and Food (Guatemala)
MERCOSUR	Southern Common Market
OIRSA	International Organization for Plant Protection and Animal Health
NGO	Non-Governmental Organization
NARE	Non-agricultural rural employment

PIRT	Rural Transportation Infrastructure Programme (Peru)
PRODAR	Rural Agroindustrial Development Programme (Peru)
SUNAT	National Superintendence of Tax Administration
SWOT	Strengths, opportunities, weaknesses, threats
UNDP	United Nations Development Programme
UNIFEM	United Nations Development Fund for Women
VAT	Value Added Tax
WB	World Bank
WTO	World Trade Organization

Introduction

RURAL TRANSPORT OF FOOD PRODUCTS IN LATIN AMERICA AND THE CARIBBEAN

Transport operations are a basic component of agrofood supply chains. They may contribute to entrepreneurial success and profits or they may spell failure and physical and economic losses for producers and other entrepreneurs at any scale of operations. Food transport is a highly complex operation. Fresh or processed products are moved raw or processed for direct consumption or for use as raw materials or ingredients in the preparation and manufacture of food, or even non-food products. Food transport is unique in that food materials are highly complex biochemical entities subject to damage by a host of agents ranging from heat, moisture, light and other physical and biochemical factors, to micro-organisms or poor handling practices. They are entities with a specific shelf life determined by their specific composition, history, handling and environment, and are therefore perishable. Food quality and safety can be seriously compromised unless transport operations are correctly and promptly carried out. This can nullify every effort made at the farm, processing plant, storage and sales stages. Lack of equipment and proper transport practices, poor transport infrastructure and logistics are crucial factors. They must be addressed to ensure food quality and safety, achieve highly efficient supply chains, and ensure the necessary sales and earnings for all involved (Heap *et al.*, 1998).

Transport affects the cost structure of supply chains and final product price in many ways. Indeed, transport is frequently the most expensive operation in the entire food chain. It can be the decisive factor for the success of a productive or business activity, or else the one constraint that makes costs prohibitive or renders a project economically unviable.

In many developing countries rural transport concerns not only the marketing of food products and the household tasks of procuring food and other essential inputs such as water and fuelwood, it also involves the basic needs of mobility and access to markets and social services, including schools and health centres. There are many low-cost alternatives for transporting small loads in rural areas. These range from carrying the load on the backs of animals or people, to shouldering loads with a pole to carry a double or single burden, to the use of carts, bicycles or motorcycles (UNIFEM, 1999).

The transport factor therefore not only affects final costs, but home food security and the competitiveness of producers and other key actors in the agrofood chains. This is independent of the scale and capacities of farmers and business people, which may be micro, small, medium or large. Transport is so important that it may become a barrier for small producers and for the development of efficient, lucrative agribusinesses. Transport is, in short, a key link in the supply chain.

Clearly, there are major needs in the post-production food chain in developing countries that demand strategies and policies, and technical and managerial action within the institutional and private sector frameworks including resource allocation plans and programmes to help improve food product transport systems, and enhance agricultural development in these countries (Mrema and Rolle, 2003).

STUDIES ON THE RURAL TRANSPORT OF FOOD PRODUCTS

The Agricultural and Food Engineering Technologies Service (AGST) carried out three studies based on an exhaustive review of the documentation backed by primary field data on

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key topics, analyzing the needs and opportunities for improved rural transport of agrofood products. It includes scenarios for the various food chains in different countries of Latin America and the Caribbean.

The work was subdivided into three sections designed at the same time to reflect the nature of the regions with some fairly specific coverage of sub-regions and specific countries. The first of the three sections covers the Central American Region, with general information on Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama, and specific examples and information from the field for Guatemala, in particular. The second section covers the Andean Pact countries: Bolivia, Colombia, Ecuador, Peru and Venezuela, with specific examples from Peru. The third section covers the expanded MERCOSUR countries: Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay, with specific field data and examples from Argentina.

The transport of food products is defined for the purposes of this study and in this context as the mobilization and displacement of these products using a range of methods and means of transport, for a variety of routes, distances and directions. However, the study focuses on motorized transport by road or highway at distances of 50 kilometres or more, for loads of at least one tonne (these being common practices in the region). Less attention has been paid to medium-scale transport operations. The study did not, however, exclude other ways and means of transport where these were important in specific countries. Air and water transport, though prominent in a number of countries, was not included in the study. Rail transport was considered where relevant.

The study looked at certain specific aspects such as the socioeconomic and policy aspects of the agrofood sector, including agricultural production volumes and characteristics for small and medium producers, the needs and demand for transport, road infrastructure, transport infrastructure and management, and marketing channels. The main problems and requirements for the development of the food transport sector were reviewed, along with successful interventions to provide feasible and practical solutions. Also considered were opportunities for implementing solutions with holistic approaches, and ways of kick-starting the improvement of transport systems, including cold chains as an alternative to rural transport. We also looked at key factors to guarantee the adequate

supply and availability of food through effective and economically viable transport systems. The effort included those policy aspects capable of affecting the effectiveness of the potential solutions to the issue of rural transport, such as capacity needs and institutional arrangements for decision-making, resource allocation and action implementation.

Each of the studies of the three subregions estimated the importance of such variables as time, distance, freight quantity (weight, volume, weight/volume ratio), value, size and type of means of transport, extent and quality of road networks, characteristics of producers and agricultural entrepreneurs, logistics and marketing practices. The impact and role of the geographical, climatic, cultural and political characteristics of a country with references to food transport systems have been considered as well. The special situation of the small farmer, the role of intermediaries, road construction and maintenance, the nature of markets, effect of the various types of farmer organizations and the importance of marketing information systems are all examples of the various aspects covered by the study. Naturally, the impact of specific transport system characteristics on the quality, safety, amount and value of agrofood products was an essential thread running throughout the study.

Small farmers are often at a disadvantage *vis-à-vis* marketing because their traditional practices and transport problems translate into inequality and inefficiency. Small farmers usually face high rates of postharvest losses — up to 30 percent of their total output. Producers may be unaware or unclear about product quality specifications and conditions demanded by the market. They may also lack the preparation to understand and meet market demand. The outcome is that small producers may get very little for the same products for which consumers pay high prices on the market. This price differential often reflects the high cost of transport, excessive post-harvest losses, the many intermediate stages from production to final sale, and other inefficiencies of the agrofood chain.

Intermediaries, for their part, consider their businesses high-risk activities due to the many threats connected with physical and economic losses, delays and uncertainties in the delivery of the harvest, and near-daily variations in supply, sales, prices and profits. Further must be remembered that transport hired in the region may not be exclusively used for food transport. This

definitely has a bearing on the final quality, safety and efficiency of operations. The study of the Southern Cone countries, in particular, offers an efficient breakdown of the issue with reference to its structural and institutional roots, and the vision of producers themselves.

A common solution to transport and logistical barriers in many countries has been to set up collection plants and/or pre-processing plants, usually in association with cooling, refrigeration and/or freezing facilities. These are designed to ensure the safe transport of perishable food products from farm to market, at the same time facilitating physical and commercial integration of the various supply chain components. This has frequently proven an effective measure; always assuming it has been properly planned and administered. The study section on the Andean countries offers some interesting data on this type of approach in Peru.

These collection and/or pre-processing plants may be installed and administered by various commercial operators, including national or multinational industries, buyers or collection agencies and product retailers, supermarket chains, cooperatives and producers' associations, or even decentralized state bodies. The plants are usually located near highways and basic services such as water, light, communications, security and financial institutions, but not always near producers, even though often sited strategically so as to maximize cost/benefit and logistical criteria. Consideration has also recently focussed on maximizing quality through value chains by means of mutual benefit linkages. The range of action of these plants may go beyond actual collection and storage to include operations such as selection, sorting, cleaning, cutting, washing, cooling, packing, traceability and quality control in line with established quality parameters or market requirements.

Such plants may have their own transport units, or simply lease and administer them. They may also use the services of a trucker, but then supervise his performance and contract. These units may either collect the product directly from the farmers, or take them directly to the plant or some previously agreed-upon midway point for transfer. In this case producers negotiate the terms of supply, including transport, directly with the plant. A second solution is for several intermediaries to perform one specific function, such as transport. They may also purchase the products from the farmer (negotiating transport costs) and then charge the

plant for the product picked up at the farmgate. In this case intermediaries may either collect the product at the farm or field or some other site such as the main local road. This usually impacts on producer income and interests, implying less room for negotiation and moving their products. In a third possibility, producers own their own transport vehicles. This happens in many rural communities in the region. Either the individual producer or some *ad hoc* association owns the truck, and several producers offset the costs of the transport units, sharing operating costs and earnings. Or producers may hire the transport unit or subcontract this service, which may or may not include loading and unloading. Producers can thus reach a collection and transfer point, or go directly to the plant or markets. They are then better placed to negotiate and organize alliances at their convenience and in accordance with their own interests.

Once transport and logistical problems have been solved and collection and pre-processing centres are contributing to food chain efficiency, proper links and mechanisms to protect the collective interest must still be put in place to ensure that producers get a fair share of the value added for their products. This demands proper organizational machinery and a modern approach to alliances of mutual benefit. The goal is to establish true value chains that can guarantee food quality and safety, and at the same time satisfy the consumer and all stakeholders in the chain, for the benefit of all. Transport costs and logistics are typically among the shared costs in the more effective alliances and in the development of business conglomerates, as is true of the implementation of effective measure to reduce post-harvest losses and costs. This is illustrated in the case study of Guatemalan farmers presented in the section on Central America and Panama.

Another crucial factor in current markets is how to meet the demand for fresh produce. Such products always have some type of value added such as sorting, cleaning or packing, unless they are directly marketed as harvested. Another exception is products destined for use as agroindustrial raw materials, where other inputs and higher costs will be necessary. Fresh products are conserved "fresh" by means of additives or preservatives, modified atmospheres or by cooling and subsequent handling and transport in cold chains. These technological inputs could drive up costs considerably in some cases, putting them beyond the reach of small producers in the Latin American and Caribbean

countries. Here the logistical and institutional support aspects of infrastructure, information and services need to be addressed and not just the technical and economic factors. Often the decision implies determining the siting of pre-processing and cooling plants with respect to the distances to be covered from farm to market, and the solution is refrigerated transport units.

Another alternative, not necessarily a better one technically but attractive in terms of costs, is an in-plant cooling operation to lower the temperature of food products for later shipping in non-refrigerated transport with insulated chambers. Though often mistakenly termed “cooled” or even “refrigerated” units, these are not really refrigerated but rather thermally insulated units. They also often prevent heat losses, so that by the end of the day the “cooled” products are practically at ambient temperature. This is even more drastic in hot climates. One decision that may need to be faced is how to combine overland transport with air and water transport in terms of market requirements and logistics, distances, costs and infrastructure.

Another example of the importance of collection centres and transport in national level food chains is a project of the FAO Technical Cooperation programme jointly executed by FAO and the Secretariat of Agriculture, Livestock, Fisheries and Food of Argentina. The project looked at the problem of the post-production grain-handling chains, especially genetically modified and non-genetically modified soybeans and maize. Participants in these chains used an integrated, participatory, multidisciplinary and multisectorial analysis to describe the various handling stages from farm to export port (Cuevas, 2003).

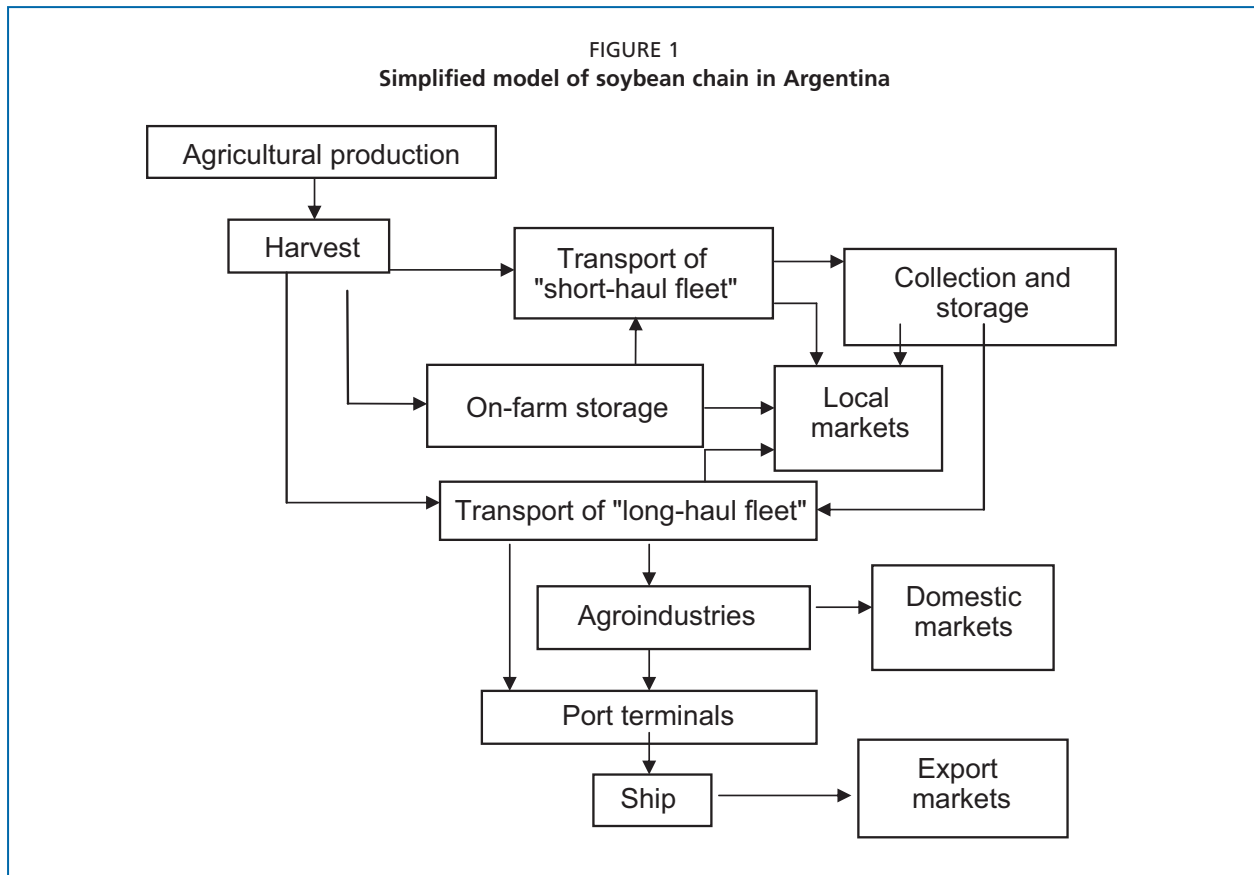
The project dealt with a highly complex issue, given the enormous distances involved and the huge quantities of grain produced, handled and exported in Argentina. Transport and logistical operations proved crucial for the efficiency of these chains, with a major impact on export costs, quality and opportunities. “Short-haul” transport, i.e., from farm to the reception, collection and storage centres, or from on-farm storage to these centres, or to domestic markets near the production units was highly significant in terms of costs, especially for small and medium producers. On the other hand, “long-haul” transport, i.e., from farm to terminal ports or regional or central agroindustrial centres, normally minimized handling but could drive up costs.

Figure 1 illustrates the model developed in the first phase of this project to describe the soy chain.

Another efficient way of introducing guidelines and regulations for food transport would be for national authorities in the various countries to recommend application of Codex Alimentarius Hygiene Practices for food transport (FAO/WHO, 1995, 1999, 2001). These cover the following aspects: food transport units, loading, in-transit storage and unloading operations for bulk, packed and semi-packed, processed or fresh products. The factors to address are final destination, freight value, expected shelf life and perishability, quantities transported, recommended conditions of transport including temperature and relative humidity, transport unit design and hygiene, plus environmental conditions at points of origin and destination. Further factors are transit time, loading and transport services conditions, dedicated transport of products for human consumption, and the quality of the service.

To sum up, transport costs are high for many farmers because their land is distant from collection and pre-processing centres, wholesale markets and export ports. Much farmland lies in mountainous areas far from main roads, or even secondary roads. Moreover, intermediaries pay a major role in the food chains, but the conditions under which they operate are very rarely advantageous for the farmer. Introducing organizational arrangements, including cooperatives, to deal with the production, transport, collection, processing and export aspects is one effective way of increasing the bargaining power, earnings and the quality of life of smallholders. This was brought out in the study on Central America and Panama. Such systems share the labour, risks and benefits through alliances in which all actors have had their say, and in which the agrofood chain truly benefits all involved.

Elements that need to be considered are cost/benefit and the advantages and drawbacks of each transport chosen, plus the requirements and special features of each, their technical and economic feasibility, and the institutional context. Several options can be combined to maximize a given situation in light of the special conditions of specific regions or countries. In Argentina, for example, overland and river transport are combined, and in other countries, overland transport is combined with air transport. Some countries, unfortunately, lack both good road and good rail systems, and environmental problems have made many rivers



unnavigable. This all helps to complicate the rural transport issue.

Packing systems, ranging from very simple, low-tech ones to very modern high-tech solutions are elements associated to food transport. Every possible packing option can be found throughout the region. Many traditionally and culturally rooted systems of food packing are still in wide use. Fresh produce is transported in bulk in many countries, sometimes with other materials used to divide them into portions. Units or bunches of the individual product may be combined in the transport chamber, or they may be mixed with non-food products. These are among the reasons for the high rate of post-harvest losses.

The failure of the supply chains and their correspondingly low profits can frequently be traced to the following problems. Cost-beneficial packing technologies are few, and modern packing materials imported from abroad and machinery are expensive. There are few trained personnel in the food chain, insufficient regulation of packing and labelling and machinery for their compliance, a lack of official food transport policies, and scarce technical assistance and financial services.

The comparative advantages of the region for production factors such as climate, altitude and latitude, rainfall, land quality, low labour and service costs, among others, can easily be minimized by the problems outlined above. These problems are carefully discussed in the following sections, covering those such as the great distances separating production areas and markets, poor transport infrastructure, lack of diversification and versatility of infrastructure and media, and the poor current conditions of the transport fleet.

For all these reasons, transport, especially food transport, is a key element in supply chains, commerce and national development, and also key to better living conditions, higher income and modern social development. The following studies tackle these issues from different national and regional approaches. They outline strategies and actions to find and implement efficient and effective solutions embodying holistic, coordinated, multisectorial proposals.

