Exporting High-Value Food Commodities

Success Stories from Developing Countries

Steven Jaffee
with the assistance of
Peter Gordon
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The World Bank
Washington, D.C.
Foreword

Changing patterns of food consumption and expenditures, together with advances in international logistics and the reduction of official barriers, have contributed to a rapid expansion in world trade in high-value food products (HVF), such as fresh and processed fruits and vegetables, meats, and fish, dairy products, and vegetable oils. This growing trade, set against the stagnation or decline in world trade and prices for many beverage and industrial crops, is leading policy-makers and donor agencies to more closely examine the scope for developing and formerly centrally-planned countries to expand or diversify their exports in these products, as well as the needed investments and policies to bring about the expanded production and trade.

This study was initiated in order to gain a better understanding of the particular technical, organizational, and commercial challenges faced in HVF export development and to draw lessons from successful country experiences in this area. The study provides a synthesis of fifteen notable 'success stories' of HVF exports among developing countries, analyzing common and idiosyncratic patterns of development, bases for competitiveness, market conditions, and institutional features.

The study is part of broader analytical efforts conducted by AGR, aiming to define the proper roles for the public and private sectors in agricultural development, to understand the functioning of private agricultural markets, and to identify 'best practices' regarding agricultural policies and technologies. It is also part of a broader effort by EMTAG to develop a strategy to support food market development and export diversification among the countries of Eastern Europe and the Near East.

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Acknowledgments

This paper benefitted from helpful comments made by S. Barghouti, W. Zijp, L. Tuck, M. McMahon, D. Steeds, J. Wallis, M. Debatisse, and E. Chobanian of the World Bank and J. Holtzman of Abt Associates. R. Henry and G. Feder provided helpful guidance and comments from the genesis of the study proposal through to its final conclusion.
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Executive Summary

0.1 Rising incomes, growing health consciousness, and urbanization are among the major factors contributing to changing dietary patterns, both in industrialized and developing countries. While there are differences in the pace and specific features of these dietary changes, there has been a common shift toward increased consumption of fresh and processed fruits and vegetables, of protein-rich meats, fish, dairy products, and vegetable oils, and of prepared 'convenience' foods. Compared with cereals and other staple food products, these foods have relatively high unit values and face relatively high income elasticities of demand.

0.2 Changing dietary patterns, together with technical advances in food-related logistics and multilateral reductions in trade barriers, have contributed to a rapid expansion in world trade in the above noted high-value foods (HVF) over the past quarter century. During the 1980s, a period in which the aggregate value of world trade in cereals, sugar, and tropical beverage crops actually declined, the above categories of HVF experienced average annual growth rates in world trade ranging from 4% (e.g. fresh vegetables; fresh meat) to more than 11% (e.g. dairy products; shell fish). World trade in HVF is now considerable. In 1988/89, it totalled $144 billion, representing 5% of total world commodity trade and a value equivalent to world trade in crude petroleum.

0.3 Developing countries have actively participated in this international HVF trade, both as importers and exporters. In 1990, exports of HVF by middle- and low-income countries totalled $52.5 billion. For comparison, the aggregate exports of such countries for coffee, cocoa, tea, sugar, cotton, and tobacco was only $26.3 billion—roughly one-half. Over the past decade, developing countries have outperformed industrialized countries in export growth for several categories of HVF (e.g. fresh/processed fish, fresh/processed fruit, oilseeds, and feedstuffs). Despite these patterns, most analyses of developing country agro-industrial experience and agricultural trade problems and prospects continue to focus on the traditional beverage and industrial crops.

0.4 In 1990, there were twenty-four middle- and low-income countries whose HFV exports exceeded $500 million. The majority of such countries are either Latin American (10) or Asian (8), with most of these countries also being among the leading developing country exporters of manufactured goods. Only a few African and Middle Eastern countries have developed significant levels of HFV exports. Two Eastern European countries—Hungary and Poland—are among the leaders as a result of their significant exports of meat products and fresh and processed fruits and vegetables.

0.5 Although many developing countries have developed some exports of HVF, there is a relatively high level of concentration of this trade among a few countries. For example, only four countries—Brazil, Argentina, China, and Thailand—account for 40% of the total HVF exports for all middle- and low-income countries. Only ten countries account for two-thirds of the total trade and twenty countries for 90%. Major cases of success in developing country HVF exporting are thus less widespread than might be indicated by aggregated data for export levels and growth.

0.6 This paper provides a synthesis of notable "success stories" of demand-driven production, processing, and marketing of HVF among developing countries. It examines in comparative perspective the development, organization, and performance of entire commodity systems rather than the experience of individual projects or companies. It focuses on cross-cutting issues and common patterns rather than elaborating on the microeconomic and historical details of individual cases. By identifying common
technical, institutional, policy, and other factors which have contributed to commodity system development and international competitiveness, the paper seeks to contribute to the design of improved strategies for supporting food market development and export diversification in developing countries and in the formerly centrally-planned economies.

0.7 A total of fifteen commodity system "success stories" from nine countries were reviewed, drawing upon consultancy, academic, and international agency studies, trade journals, USDA country and commodity reports, and official and international agency production and trade data. Two case studies benefitted from prior field work conducted by the author. Abbreviated case studies (of 2 to 5 pages) are presented in an Appendix with the main text providing a synthesis of the operating contexts, performance patterns, and organizational features of the focal cases. Important cross-cutting issues include: the respective roles of the public and private sectors, the importance of foreign capital and technology, the institutional links between producers, processor/exporters, and foreign market distributors, and the conjuncture of market, technical, policy, and other factors which contributed to the export booms experienced in these commodity systems.

0.8 The fifteen cases covered had aggregate export earnings of $11 billion in 1988/89, representing more than 20% of total HFV exports by all middle- and low-income countries. The nine countries included in the sample together account for 50% of developing country HFV exports. The cases selected cover a range of horticultural, fish, meat, and oilseed products and include commodity systems whose 'take-off' or boom periods occurred in different decades. Although the majority of cases experienced such export booms in the 1970s and/or 1980s, several of the commodity systems pre-date this period, with two dating back to the 19th Century. The specific cases examined are: (1) Mexican fresh tomatoes, (2) Kenyan specialty and 'off-season' vegetables, (3) Israeli fresh citrus, (4-6) Chilean temperate fruit, processed tomatoes, and fish products, (7-8) Brazilian frozen concentrated orange juice and soybean products, (9-10) Argentine beef and soybean products, (11-13) Thai poultry, tuna, and shrimp, (14) Chinese shrimp, and (15) Taiwanese high-value processed foods.

Economic and Institutional Issues in the Marketing of High-Value Foods

0.9 Consistent with recent work on agro-industrial development (Austin (1992)), the paper argues that major problems in food marketing and the range of institutional, infrastructural, and technological solutions to such problems are best understood when examined from a commodity systems perspective. This perspective emphasizes that modern food marketing is demand-driven, that farm-level production and downstream marketing activities are highly interdependent, and that such activities must therefore be coordinated, whether through market, cooperative, or administrative means.

0.10 The paper identifies a series of intrinsic technical and economic characteristics of food commodities/raw materials, food production, and marketing infrastructure and services which can lead commodity system participants (e.g. farmers, processors, traders) to experience major problems related to production and market risk, inadequate or asymmetric information, logistical bottlenecks, and high transaction costs. Among the noted intrinsic characteristics include: a) the bulkiness, perishability, and heterogeneity of food commodities/raw materials, b) the yield uncertainty, seasonality, and extended gestation periods associated with the production of many foods, and c) the public good aspects, externalities and/or economies of scale associated with many types of marketing-related infrastructure and marketing services.
The paper then examines a range of technical, institutional, and other measures which can counter the incentive, risk, transaction cost, and logistical problems raised by the intrinsic technical and economic properties of food commodities, production, etc.. Many of these counter measures are essentially market or quasi-market responses on the part of private firms and individuals; others entail government interventions which stimulate, re-direct, constrain, or supplement private activity.

Drawing from the industrial development literature, the paper also examines the issue of commodity system competitiveness and its contributing factors. From Porter (1990), it is noted that a commodity system can achieve a competitive advantage either by 1) having lower costs of production and delivery, or 2) differentiating its product(s) through its quality or through accompanied technical or marketing services. A lower cost structure allows a commodity system to underprice its competitors or obtain higher returns when international prices are at or near the competitors’ costs. Product/service differentiation facilitates the attainment of premium prices and/or the ability to fill profitable niches in the market.

Five sets of factors are discussed as being determinants of commodity system competitiveness. These are: 1) the size and patterns of food demand, 2) macroeconomic and sector policies, 3) natural resources and human capital, 4) physical, technical, and social infrastructure, and 5) micro-marketing and logistical activities and the coordination of production with downstream requirements. The first and second of these factor sets determine or strongly influence the incentives for specialized food production and marketing activities. Factor sets (3) and (4) determine the capacity to respond to these incentives, while factor set (5) determines the efficiency of this response and the quality of the resultant product(s).

Synthesis of HVF Commodity Success Stories

Among the nine focal countries, only three--China, Thailand, and Brazil-- have achieved levels of agricultural performance above the norm for middle- and low-income countries over the 1965 - 1989 period. Over much of this period, each of the other focal countries has experienced rates of growth in agricultural GDP and total food production which trail aggregate growth rates for middle- and low-income countries. However, in certain commodity systems, including those examined in this paper, the focal countries have experienced high rates of production and trade growth, either spanning several decades or covering the past decade. Double-digit rates of growth in production and/or trade have been experienced in one, two, or more decades for each of our focal cases. The commodities in question have come to account for rising shares of national food exports.

Most of the focal commodity systems experienced their initial export booms during the 1970s or 1980s in response to favorable international market opportunities. Some cases featured phenomenal export growth, as in the growth of Brazil’s soybean/soybean product exports from only $71 million in 1970 to $2.2 billion in 1980, and the growth in Thailand’s canned tuna exports from zero in 1980 to over $500 million by the end of the decade. Large increases in world market shares were recorded in several of the focal cases. In such cases as Mexican tomatoes, Chilean temperate fruit, Thai tuna, Chinese shrimp, Brazil FCOJ, and Brazilian and Argentine soybeans/soybean products, the focal commodity systems are (among) the leaders of world trade.

In the majority of cases, the focal commodity systems have (or had) a production cost advantage over major rivals due to a combination of relatively low labor costs, low land costs, government-built or -subsidized infrastructure, and/or relatively high yields. These production cost advantages have been
at least partly off-set by higher processing, packaging, and/or transpo costs, especially in comparison with industrialized country competitors.

0.17 In many of the focal commodity systems, either initially or more recently, firms have sought to compete in international markets by differentiating their products and/or marketing services. This has included efforts to provide especially high-quality products, to supply products matching special manufacturer requirements or consumer tastes, and/or to supply a broad range of products. In several cases (including Thai poultry and shrimp, Chilean fish products, and several areas of food processing in Taiwan (China)), firms (or an entire industry) have made a successful transition from being low-cost, low-price suppliers to suppliers of high-quality, value-added products obtaining premium prices. In the case of Taiwan (China), rising labor and other costs rendered such product up-grading essential for industry survival.

0.18 Each of the focal commodity systems faced highly favorable international market conditions during their initial export boom years and for many years thereafter. Not only did income growth and changing life-styles contribute to generally increasing demand, but several of our focal commodities experienced sudden market undersupply periods ("market vacuums") lasting for several years as a result of trade embargoes or climatic, political, or other problems experienced by traditional suppliers. Furthermore, most of the commodities covered in this study are foods about which industrialized country consumers are well aware and for which market distribution channels pre-dated the arrival of the focal country firms. Hence, market development costs were far lower than they would be if an exotic product were being introduced.

0.19 Most of the focal commodity systems have also featured favorable trends in domestic market demand. In more than half of the cases, export development followed upon many years of domestic marketing experience, during which infrastructure and institutions were built up. In these and in several other cases, export booms were accompanied by a rapid growth in the domestic market which provided an outlet for blemished or local grade produce, an outlet for animal/fish parts or products which can not be profitably exported, and an overall fall-back position in case of unforeseen barriers to export. In several cases, levels of domestic per capita consumption are (among) the highest in the world.

0.20 The paper provides a brief review of the macroeconomic context in which commodity systems emerged and later developed. For only two of the focal countries—Taiwan (China) and Thailand—has the macroeconomic environment been generally favorable for investment and export development over most of the past quarter century. While China featured strong government controls on investment and trade until the 1980s, each of the other focal countries has experienced extended periods of currency overvaluation, high inflation, and low growth and investment. Still, for many of the focal cases, export booms took place just after or parallel with the adoption of macroeconomic and trade reforms which improved incentives. The only exception to this was with Argentine soybeans/soybean products, whose initial export boom (in the early-to-mid-1970s) accompanied the implementation of more stringent trade controls and higher export taxes by a new administration.

0.21 In thirteen of the fifteen focal cases, the private sector has played a dominant or exclusive role in commercial production, processing, and marketing. This private sector has generally consisted of both local and foreign/joint venture companies with the former continuing to account for the majority of trade in all but one of the cases. A dominant or major commercial role for government agencies has occurred only in the cases of Chinese shrimp and Israeli citrus. In the former, state enterprises were instrumental in the initial development of aquaculture and in the continued development of trade. In the latter, an export monopoly marketing board replaced a formerly competitive private and cooperative trade and
retained its monopoly until 1991. In several other cases, government agencies have undertaken some trade, either in conjunction with domestic price support and stockholding programs or as part of government to government international deals. The magnitude of such trade has generally been quite small.

0.22 While state enterprises have played prominent commercial roles in few of the focal cases, in virtually all cases governments have played important facilitating roles. This has included the provision of social overhead and marketing infrastructure (e.g. ports, railways, roads, cold stores, auction/terminal markets), programs in agricultural and food technology research and training, factory and/or product inspection and certification, and, in about half of the cases, some form of market information scheme. In many cases, governments have negotiated favorable terms for international market access and offered some form of trade promotion assistance. Each of these common areas of government involvement pertain to facilities or services which either have public good properties or give rise to externalities.

0.23 In a majority of cases, government interventions have extended beyond the above roles to include more active microeconomic interventions. This has frequently involved one or more types of subsidy or investment credit, although in the majority of cases such bonuses were available to producers, processors, and traders of other commodities as well. Price supports and/or price or quantity controls have been periodically applied in many of the focal cases. Data available for several of the focal Latin American case studies indicate that the aggregate effect of direct and indirect government interventions has been one of net taxation, suggesting that levels of production and trade would have been higher in the absence of interventions.

0.24 The paper examines organizational patterns in the focal commodity systems, including competitive structures and institutional links between producers, processors/exporters, and foreign market distributors. In the vast majority of cases, while domestic marketing systems have remained decentralized, export-oriented processing and trade has tended toward high rates of concentration with between three and ten firms accounting for the bulk of capacity and trade. In some cases, such concentration patterns have derived primarily from economic factors (e.g. economies of scale, differential capabilities and performance, etc.); in other cases, government interventions have determined or directly contributed to such patterns. Concentrated (although not monopolistic) trade structures have apparently facilitated improved quality control, marketing logistics, and, in some cases, an ability to influence world commodity prices.

0.25 Another common organizational pattern has been the prominence of contract farming and/or vertical integration in the linkages between farm-level production and downstream processing and trade. Open market buying and selling of raw materials has become only a supplementary, market-clearing mechanism in many of the focal commodity systems. In many cases, the leading firms have developed their own programs of applied research, extension, input delivery, and credit as a supplement or replacement for markets and government programs for such services.

0.26 Contract-based or intra-firm trade have also been significant features of the export operations in the majority of the focal commodity systems. Such long-term marketing ties have helped to maintain market access, lower logistical and transaction costs, and facilitate flows of information and technologies which have enabled suppliers to better meet changing consumer and buyer tastes and requirements.

0.27 Foreign capital, technology, training, and/or management skills have played an important role in the development of most of the focal commodity systems. In virtually all of the focal Latin American cases, credit from foreign distributors or direct foreign investments in production and/or
processing/marketing facilities played a major role in initial subsector growth. Similar agroclimatic conditions between the focal countries and parts of the United States facilitated the transfer of crop varieties and of cultivation techniques.

**Lessons and Policy Implications**

0.28 One of the lessons of the "success stories" experiences is that agricultural export diversification by developing countries need not focus on exotic tropical commodities and need not depend upon low labor costs for international competitiveness. The collective experience suggests that developing countries can compete against industrialized country suppliers in the markets for a wide range of high-value and high-volume commodities on the bases of both cost and quality. Although such quality-based competitiveness did not occur overnight, with the liberal adoption/adaption of foreign technologies and advice and with the build-up of local skills, infrastructure, research capabilities, and experience, many of the focal commodity systems succeeded to match or exceed competitive quality standards within a decade after initial international market entry. A niche market strategy may well be necessary for very small countries which lack the capacity the potential to serve mass-market distribution systems. Larger middle- and low-income countries should aspire to compete in larger, faster growing markets.

0.29 A second important lesson is that successful export diversification often depends upon prior or parallel development of domestic markets. None of the focal commodity systems has developed as an export-oriented enclave and relatively few have relied upon export markets for the bulk or even the majority of their sales. This complementarity between export and domestic market development is much more important for high-value food commodities than it is for many traditional developing country export crops (e.g. tropical beverages, tobacco) given the limited domestic market for the latter. This suggests that government and donor programs and other interventions geared towards agricultural export diversification should not only seek to build upon existing domestic marketing experience, but should also incorporate investment and other components to support further domestic market development.

0.30 A third lesson is that governments and donors should facilitate foreign and joint venture investments and international transfers of production and processing technologies. This implies a streamlining of procedures for foreign investment, and a reduction in tariff and non-tariff barriers for the importation of planting materials, irrigation and processing equipment, and other technology-embodied inputs into agribusiness operations.

0.31 A fourth lesson is that while favorable macroeconomic conditions and policies have provided stimuli for new investments and expanded trade for most of the focal commodity systems at certain points in time, much of the initial supply response to favorable international market conditions and most of the sustained production and trade expansion experienced in the focal cases can be attributed to a combination of a) microeconomic developments (e.g. joint ventures, vertical integration, investment incentive programs, etc.), and b) investments in human capital and support structures (e.g. infrastructure, research). This implies that efforts geared toward promoting agricultural export diversification will need to extend beyond policy reform programs to include human capital and brick and mortar investments as well as microeconomic initiatives.

0.32 A final lesson is that both the public and private sectors have important roles to play in the development of high-value food exports. Among the prerequisites for profitable and sustainable trade are the availability of transport and telecommunications facilities and the maintenance of law and order. These goods and services are normally provided by the public sector. In the focal commodity systems, the role
of the public sector has extended beyond these basic public goods and services. Probably the most important means of government support has come through the development of public 'knowledge systems', comprising research, training, extension, quality control, and market information services. While such public services were commonly supplemented (or replaced) by private initiatives once the commodity systems reached relatively advanced levels of development, these public services were generally crucial in the initial development or adoption of production and processing technologies and in the subsequent improvements in productivity and quality which enabled the participating firms to successfully compete in international markets. In many of the focal cases, government agencies have also conducted export promotion activities, although these were generally less important than efforts to negotiate favorable or at least equitable access to important international markets.

0.33 The collective experience of the focal commodity systems leads to the conclusion that the commercial production, processing, and marketing of high-value foods should be left to the private sector. While in several of the focal cases public enterprises have directly participated in trade, most such enterprises have adopted a production push- rather than market-orientation, have been averse to risk-taking, and have been operationally inflexible. Though proving adept at selling commodities to undersupplied markets, such state enterprises were not effective in marketing differentiated products in competitive markets. In contrast, the private sector (including trading cooperatives) has demonstrated far greater ability to anticipate, respond to, or cultivate changes in market demand and service requirements and has been far more innovative in developing products and inter-organizational linkages to facilitate expanded trade. These differential properties of public and private trading enterprises are particularly important in the development of high-value food exports given the importance of service, quality, and product form differentiation in major international markets for these goods.
I. Introduction

1.1 Increased disposable incomes, urbanization, and growing health consciousness are among the major factors contributing to changing dietary patterns, both in industrialized and developing countries. While the pace and specific components of such dietary changes have varied between countries and among different income and residential groups within individual countries, there has been a general shift toward increased consumption of fresh fruit and vegetables, of protein-rich foods such as meats, fish, dairy products, and vegetable oils, and of prepared 'convenience' foods with high value-added.

1.2 Compared with traditional staple foods (such as foodgrains, legumes, roots, and tubers), these horticultural, livestock, fisheries, oilseed, and prepared foods have considerably higher unit values and face much higher income elasticities of demand. While representative world prices for sorghum, maize, and wheat in recent years have been in the range of $75 to $175 per metric ton, many fruits and vegetables, juices, meat and fish products, and animal feed products quote international prices of $500 or more per metric ton. Among industrialized market economies, the estimated income elasticity of demand for cereals is -0.22, compared with between +0.25 and +0.38 for meat, eggs, and fruit and vegetables. For developing countries, the income elasticity of demand for cereals has been estimated at +0.16, compared with between +0.61 and +1.00 for the noted high-value commodities.¹

1.3 Compared with many traditional developing country agricultural crops, the noted high-value foods (HVF) have exhibited far more favorable trends in international trade over the past decade. For example, while developing country trade in coffee, cocoa, cotton, and sugar actually declined in value during the 1980s, developing countries as a group experienced annual export growth rates of 4 - 11% over this period for such product categories as fresh and processed fruits and vegetables, fresh and processed fish products, feedstuffs, and oilseeds.² For several categories of HVF, developing country trade performance matched or exceeded that of industrialized countries.

1.4 World and developing country trade in high-value food products--defined here to include meats, dairy products, fish products, edible horticultural products, spices, oilseeds, animal/vegetable oils, and animal feedstuffs-- is now considerable. In 1988/89, world exports in such products totalled approximately $144 billion. For comparison, this was the same value for world trade in crude petroleum that year and represented about 5% of total world commodity trade.³ World trade in edible horticultural products alone ($40.3 billion) exceeded that for cereals ($38.6 billion).⁴

1.5 According to FAO trade statistics, the 1990 exports of high-value foods by middle- and low-income countries were valued at $52.5 billion, representing more than one-third of total world exports

¹ See Sarma and Young (1985) for data for cereals, meat and eggs, and Islam (1990) for data for fruit and vegetables.


³ Data obtained from UNCTAD (1991) Handbook of International Trade and Development Statistics, Table 4.3.

⁴ Ibid, and FAO Trade Yearbook.
of these products. For comparison, the combined value of developing country exports of tropical beverage crops, sugar, cotton, and tobacco in that year was only $26.3 billion—roughly one-half. Despite the quantitative significance of developing country high-value food exports, analyses of developing country agricultural trade and agro-industrial experience and prospects continue to focus primarily on the traditional export and industrial crops.

1.6 Many middle- and low-income countries have developed export trades in one or more categories of high-value foods, either on a specialized basis or as an extension of domestic marketing activities. In fact, in 1990, twenty-four such countries had exports of HVF which exceeded $500 million. These countries, the majority of which are either Latin American or Asian, are listed in Table 1.

| Table 1: Leading Middle- and Low-Income Exporters of High Value Foods (1990)* |
|---------------------------------|---|---------------------------------|---|---------------------------------|---|
| Country            | Value ($ Millions) | Country            | Value ($ Millions) | Country            | Value ($ Millions) |
| Brazil            | 5,852              | Indonesia          | 1,864              | Ecuador           | 945               |
| Argentina         | 5,017              | India              | 1,723              | S. Africa         | 855               |
| China             | 4,825              | Korea              | 1,718              | Peru              | 571               |
| Thailand          | 4,301              | Mexico             | 1,667              | Costa Rica        | 531               |
| Malaysia          | 2,463              | Hungary            | 1,600              | Senegal           | 525               |
| Taiwan (China)    | 2,451b             | Poland             | 1,338              | Colombia          | 505               |
| Turkey            | 1,997              | Philippines        | 1,294              | Honduras          | 504               |
| Chile             | 1,919              | Morocco            | 1,075              | Uruguay           | 500               |

*a Aggregate of exports of 1) meats/products, 2) dairy products, 3) fish/products, 4) fresh and processed fruits/vegetables/nuts, 5) feedstuffs, 6) oilseeds, 7) vegetable/animal oils, and 8) spices.

*b Data for 1989


5 The 33 largest exporters each had HVF exports exceeding $200 million. Their total HVF exports came to $51.12 billion. As only a few other middle- and low-income countries recorded HFV exports exceeding $100 million, we estimate the sum total of such exports to be less than $1.5 billion.


7 This does not include Hong Kong and Singapore. While HVF exports exceed $1 billion for both countries, these countries are net importers of such products. Their exports are largely re-exports of products from China, Thailand, Malaysia, and other countries.
1.7 While many middle- and low-income countries have indeed developed HVF export trades, Table 1 indicates that a relatively small number of countries account for the bulk of this trade. In fact, only four countries—Brazil, Argentina, China, and Thailand—account for 40% of developing country exports for HVF. The leading ten countries account for two-thirds and the top twenty countries account for nearly 90% of the total. This implies that the remaining 100 plus middle- and low-income countries have played a very minor role in world HVF trade, except perhaps as importers or as suppliers of special products to relatively small niche markets.

1.8 This study provides a synthesis of notable "success" stories of demand-driven production, processing, and marketing of high-value foods and feeds among developing countries. It focuses on major cases of successful export development, which have either spanned many decades or have emerged only over the past decade in response to new market opportunities. In the majority of these cases, there have also been significant prior, parallel, or subsequent development of domestic demand and commodity distribution.

1.9 The review examines the development, organization, and performance of entire 'commodity systems', rather than the experience of individual companies. Primary attention is given to common patterns and cross-cutting issues, rather than to the historical and microeconomic intricacies of particular cases. The study seeks to identify the common technical, institutional, policy, and other factors which have contributed to commodity system development and international competitiveness.8

1.10 The desk research upon which this study is based was undertaken as part of a joint EMTAG/AGR review of "Non-Farm Private Activities in the Food Marketing System", designed to draw lessons from successful food processing and marketing experiences in OECD and relatively advanced developing countries for possible application within the countries of Eastern Europe and the Mediterranean Basin.9 This orientation strongly influenced the selection of case studies. First, it led to a focus on temperate or Mediterranean-type commodities which are currently or which prospectively could be produced on a competitive basis within the focal regions. Hence, the sample of case studies was drawn from commodity systems involving tomato products, temperate and citrus fruits, tree nuts, value-added meat and fish products, and temperate vegetable oil/feed crops. No tropical food or feed products (e.g. pineapples, processed cassava) were included. Second, it was determined that the vast majority of case studies should be drawn from middle-income countries whose levels of human capital and infrastructure approximate those found in Eastern Europe and the Mediterranean Basin.

1.11 'Successful' commodity systems from twelve countries were selected for analysis. However, due to the availability of insufficient information for three cases, only nine countries were represented in the final analysis.10 These countries represent different geographical regions as well as low-income (Kenya, China), middle-income (Argentina, Brazil, Chile, Mexico, and Thailand), and high-income (Israel, Taiwan(China)) countries. This sample of countries accounts for about 50% of the total HVF exports of

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8 Readers are referred to two recently published studies (Pomereda and Zorrilla (1990); and Barghouti et al. (1992)) which deal with issues related to agricultural modernization and diversification from a regional perspective.

9 The final reports from this EMTAG/AGR study are expected in early 1993.

10 Inadequate information for an analysis of commodity system development, organization and performance was available for the tree nut industry in Turkey, for potatoes in Cyprus, and for canned fruit in South Africa.
developing and centrally planned countries, with seven of the nine countries having HVF exports which exceed $1.5 billion.

1.12 For several countries only one commodity system was examined; for others, two or three different commodity systems were analyzed. A total of fifteen cases were examined, covering a range of horticultural, meat, fisheries, and oilseed products. Some of the focal commodity systems date back several decades or even to the 19th Century; others have emerged to a position of international competitiveness only during the past decade. The specific cases covered in the analysis are:

1) **Mexico Fresh Tomatoes**—the longest standing and most successful case of developing country 'off-season' fresh vegetable supply to the United States.

2) **Kenya Fresh Vegetables**—Sub-Saharan Africa's most successful trade in 'off-season' and specialty fresh vegetables to niche markets in Western Europe.

3) **Israel Fresh Citrus Fruit**—a long-term major player in the Mediterranean-Western Europe citrus trade. While the sub-sector's competitive position in this trade has recently declined, a domestic processing industry has developed which has absorbed the bulk of production and has undertaken competitive exports of various value-added products.

4) **Brazil Frozen Concentrated Orange Juice**—an industry which was transformed from a cottage industry to the dominant world exporter in a large international market in the space of only fifteen years.

5) **Chile Temperate Fruits**—the large-scale export of counter seasonal supplies of grapes, apples, and other fruits to previously developed Northern Hemispheric markets.

6) **Chile Tomato Paste**—a recent rapid expansion in production and trade in response to a market 'vacuum' generated by an trade dispute between the U.S. and the EEC.

7) **Argentina Beef**—a long-standing commodity system which has supported the highest per capita consumption in the world and has remained internationally competitive for quality products despite macroeconomic instability and direct taxation at home and protected markets and subsidized production abroad.

8) **Thailand Poultry**—a cottage industry transformed by technological and institutional changes to bring about a rapid expansion in local consumption and a rising share of the Japanese market.

9) **Thailand Tuna**—a canning industry whose exports rose from zero in 1980 to nearly 50% of the rapidly expanding world market by the end of the decade.

10) **Chile Fish and Fish Products**—rapid growth and new product development for one of the major world exporters of fish products.

11) **China Shrimp**—the recent rapid development of the world's lowest cost and largest shrimp export industry.
12) **Thailand Shrimp**—the expansion and product diversification of a leading shrimp exporter which has recently shifted to aquaculture and which has taken advantage of an established infrastructure for food processing.

13) **Brazil Soybean**—a 1960s and 1970s boom in production, processing, and trade driven by favorable international markets and technological improvements.

14) **Argentina Soybean**—the rapid development of an internationally competitive industry within a climate of macroeconomic instability.

15) **Taiwan (China) Agricultural Diversification and Food Processing**—the demand-driven restructuring of agricultural production, food processing, and agricultural trade away from rice and agricultural raw materials to value-added pork, fish, and fruit and vegetable products.

**Structure of the Paper**

1.13 The balance of this paper is organized as follows. Section Two provides a conceptual framework for examining the development, organization, and performance of food commodity systems. In this section, we define commodity system competitiveness and identify its major contributing factors. We also examine a variety of generic barriers to entry, efficiency, and coordination in food commodity systems and a countervailing range of technologies, institutions, and other mechanisms to overcome such barriers.

1.14 Section Three provides a synthesis of the focal 'success stories' of HVF export development. It examines selected indicators of commodity system performance, reviews the international market and domestic macroeconomic/human capital/infrastructure environment in which these commodity systems developed, and reviews common and divergent organizational patterns. Among the cross-cutting issues addressed are the respective roles of the private and public sectors, the prevailing competitive structures, the roles of foreign capital and technology, and the prevailing institutional arrangements linking producers, processors/exporters, and foreign market distributors.

1.15 Section Four provides a summary of this analysis and suggests lessons for developing countries. The Appendix offers the individual case studies, reviewing historical patterns, major factors in development, etc. Each case study is condensed into a few pages, with ample references provided for further study.
II. Economic and Institutional Issues in the Marketing of High-Value Foods

Marketing High-Value Food Products

2.1 A high-value food product represents the outcome of a multiple and sequential series of investments, decisions, activities and decisions; the outcome of a process which begins with the articulation of consumer demand, leads to decisions by farmers and fishermen to produce, raise, or catch particular crops, animals, and fish, and continues through a series of activities which produce and subsequently transform the crop or animal product in form, time, and place to match consumer demand (Breimyer (1976)). Hence, in the case of high-value foods, all profitable and sustainable production, post-harvest, and distribution activities must be demand-driven: they must cater to and adjust to changes in consumer preferences for quality, variety, convenience, location, price, etc.

2.2 Food marketing is the physical and economic bridge which links raw material production and consumer food purchases. It involves a set of interdependent decisions, investments, institutions, resource flows, and physical and business activities (Kohls and Uhl (1985). As the bridge between producers and consumers, the main roles for food marketing are to:

a) **Stimulate and Support Raw Material Production**—food marketing plays a critical role in stimulating, orienting, and facilitating raw material production at the farm level. This entails the communication of information to farmers regarding what (and when) to produce, the provision of financial (and other) incentives to farmers to produce food items for sale, the reduction of transaction costs between producers and consumers, and the facilitation of farmer access to those production resources (e.g. credit, material inputs) needed to respond to such incentives.

b) **Balance Commodity Supply and Demand**—food marketing institutions must provide the organizational framework to coordinate production and consumption. It must balance the supply and demand for food raw materials and commodities, not only in quantity terms, but also in terms of quality, time, and place. This entails logistical and informational tasks, transacting for current or future supplies, quality control measures, and making physical changes to the raw materials/commodities themselves.

c) **Stimulate Demand and Enhance Consumer Welfare**—food marketing should promote increased effective demand, consumption, and consumer welfare by introducing new products, improving product quality, reducing consumer costs, making foods available on a more consistent basis, and educating consumers on the merits and alternative uses of products. These tasks will require the development and application of processing and logistics technologies, the dissemination of information, and the development of efficient mechanisms for the exchange of goods.

2.3 The process of marketing high-value food products transcends several different industries and markets and may cross international borders (Marion et al. (1986)). In this process, the physical commodity can be conceived of as 'flowing' from one value adding stage to another, with each of these stages being associated with a particular industry as conventionally defined (e.g. transport, food processing, packaging, retailing). The product gains value as its form is changed and/or as it is graded, stored, packaged, and transported to more closely match consumer demand. Preceding, accompanying, or following these physical commodity flows are additional flows, namely for a) product, market, and technical information, b) financial resources, and c) ownership rights to the commodity.
2.4 In the marketing of high-value food products, many of the pertinent production, post-harvest, and distribution activities require specialized technical or market knowledge, skills, or assets and/or require the presence of participants in particular locations. This suggests possible gains from a division of labor, whereby potentially many different individuals and organizations specialize in the performance of one or relatively few physical and business activities. However, given the nature of food marketing, there will remain a strong degree of interdependence among these various individuals/organizations; an interdependence which must be reflected in effective coordination of participant decisions and activities, whether through market, administrative, or other means (Davis and Goldberg (1957)).

Food Commodity Systems: Organization, Coordination, and Performance

2.5 Recognizing that production and food marketing activities are interdependent, that those individuals and organizations performing such activities are themselves interdependent, and that such activities and economic entities are linked through a network of exchange relations and additional coordinating mechanisms, it is appropriate to view them as elements of a 'system' (Arthur et al. (1968). Faced with enormous problems in both conceptualizing and empirically studying national food systems, agribusiness and agricultural marketing analysts have focused their attention on individual commodity systems11, defined by Marion et al. (1986) as: "small economic systems, . . . incorporating an interdependent array of organizations, resources, laws, and institutions involved in producing, processing, and distributing an agricultural commodity." Commodity systems may involve the production, processing, and marketing of only a single commodity or else that of a set of very closely related commodities (as in dairy product, poultry, oilseed, or citrus fruit systems).12

2.6 Individual commodity systems exhibit widely different organizational characteristics, both within and among countries. Most commodity system studies by agricultural economists and agribusiness specialists describe both 'horizontal' and 'vertical' structural elements, the former being entry and competitive conditions prevailing at each industry stage (e.g. processing, retailing); the latter relating to the location/timing/clustering of marketing functions, inter-stage differences in size, seasonality, etc., the number of parallel marketing channels, and the incidence and forms of contractual or ownership integration. Government programs affecting the commodity’s production and marketing are also described in most studies.13 14

11 Agricultural economists have tended to use the term commodity 'sub-sectors'. This is an inappropriate term since there is nothing 'sub' about them, except that they include particular sub-components of agriculture. A more appropriate term would be 'trans-sector' since the focal system cuts across several sectors, markets, or industries.

12 As with industries or markets, commodity systems are conceptual artifacts. The borders between one commodity system and others may be quite hazy. This is especially true where highly processed foods are concerned. Many individual foods are the product of several commodity systems. For example, the manufacturer of prepared soups and ready-to-eat meals frequently draws upon raw materials from the vegetable, grain, and meat sectors. Changes in technologies are rendering more agricultural raw materials substitutes for another, this again blurring the distinctions between certain traditional commodity systems.

13 Studies by Goldberg (1974), Morissey (1974), and Marion et al. (1986) typify this type of analysis.

14 Few commodity system studies really apply a 'systems' perspective. To do so, the organizational analysis would need to focus on or at least be cast in terms of the set of ordered trading, bargaining, and other relationships which exist among and between producers and marketing entities and which link such participants.
2.7 In commodity system analysis, a central focus lies on the problems and mechanisms for coordination (Goldberg (1968); Marion (1976)). Coordination is a general problem of arranging for interdependent conditional activities: a problem of linking the decisions and actions of different technical or ownership units when collective or overlapping tasks are performed. In food systems, a major challenge is that of 'vertical coordination': the process of harmonizing the decisions and actions of input suppliers, farmers, processors, and traders so as to match the supply and demand for food raw materials and products (in terms of quantity, quality, timing, and location) at the various value-adding stages (Mighell and Jones (1963). This process entails significant flows of information and other resources which define and shift incentives. It also entails the definition and redefinition of required, permissible, and impermissible patterns of behavior for system participants. In a food marketing context, the absence of effective vertical coordination is likely to result in resource misallocations, technical inefficiencies, and enhanced production and marketing risks.\(^{15}\)

2.8 Research on food marketing and commodity system performance has utilized a large number of indicators and norms.\(^{16}\) While, most food marketing work has given attention to dimensions of operational and allocative\(^{18}\) efficiency, more selective coverage has been given to issues related to the longer term development patterns and the broader economic impact of commodity systems.\(^{19}\) When one assumes that marketing is a demand-driven process (as in the case of high-value foods), an analysis of performance should also gauge the quality of marketing services, whether through quantitative indicators or through the subjective views of marketing intermediaries or consumers.\(^{20}\)

2.9 When recognizing the importance of (vertical) coordination in the process of producing and marketing a high-value food product, it is important to include measures or qualitative indicators of transaction costs when evaluating commodity system performance. Transaction costs--the whole array of costs associated with buying, with external constituents and bodies, including consumers as well as government agencies. One important exception is the analysis of the Latin American banana export system provided by Arthur et al. (1968).

\(^{15}\) For example, where the quantity of a commodity supplied exceeds the quantities purchased, extra storage costs will be incurred or part of the crop will be wasted. Where the quantity falls short of that demanded, the commodity buyer may not be able to fully utilize his processing or other marketing facilities (thus raising unit costs) and may not be able to meet demand further 'downstream'. On these and other inefficiencies and resource misallocations in food markets, see Lang (1977).

\(^{16}\) For a summary of different approaches and findings, see Helmberger et al. (1981).

\(^{17}\) Including production and extraction yields, rates of capacity utilization, unit costs, and input/output ratios.

\(^{18}\) Including the extent to which market prices reflect consumer preferences, opportunity costs, and the actual costs of commodity storage and transport.

\(^{19}\) Such criteria have included: rates of profitability and investment, degrees of price and income stability, rates of growth in the volume and value of marketed products, levels of raw material and commodity wastage, product quality and variety, market access and foreclosure, the distribution of income and risk, the levels and types of employment provided, and the adaptability and innovativeness of commodity systems in the face of changing consumer tastes and technological opportunities.

\(^{20}\) Such service quality might relate to a) the rapidity of response to purchase orders, b) the punctuality of transport and delivery, c) the regularity of supply, d) seasonal or daily adjustment of supply according to order, e) special grading or labeling, f) product uniformity, and g) the inclusion of a particular mix of products. Marketing service quality is further discussed in Jaffee (1986) and Peters (1992).
selling, and transferring ownership of goods and services--may in some contexts be as significant as direct production costs and/or the costs of physical marketing functions such as storage and transport. Transaction costs include: a) the information costs incurred in identifying and screening different trading opportunities, outlets, and partners, b) the costs of negotiating exchange agreements, c) the costs of actually transferring goods, services, money, and ownership rights, d) the costs of monitoring trade conditions to determine whether the agreed terms are complied with, and e) the costs of enforcing stipulated terms through legal, social or other means (Dahlman (1979); Williamson (1979); Leblebici (1985)).\textsuperscript{21} Despite their considerable importance, transaction costs have rarely been examined (or measured) in studies of food marketing in developing countries.\textsuperscript{22}

\textbf{Commodity System Competitiveness}

2.10 In contrast to the burgeoning literature dealing with the performance of manufacturing sectors, the food marketing and commodity system literature devotes little attention to the issue of the competitiveness of commodity systems, except in the narrow sense of comparative costs of production, transport, etc. A food commodity system must be competitive in two different ways in order to be sustainable and provide remunerative returns to producers, processors, and traders. First, it must be competitive with other industries or agricultural commodity systems within the same country in attracting or mobilizing resources needed for its functioning (e.g. land, labor, capital, or other resources).\textsuperscript{23} Second, except in a totally autarkic or protected situation, a commodity system must also be competitive absolutely against similar commodity systems or industries from other countries. The commodity system may have to compete against these rivals in international markets or may be threatened by them through imports into the domestic market. This is what the literature refers to as 'competitive advantage' or 'international competitiveness'.\textsuperscript{24} This second form of competitiveness is of primary interest here.

2.11 Writing in the context of manufacturing industries, Porter (1990) argues that they are two basic types of competitive advantage which firms or industries may have vis-a-vis their rivals. These are:

1) \textbf{lower cost of production and delivery} which allows the firm/industry to underprice its competitors or to obtain superior returns when prices are at or near the level of competitors, and

2) \textbf{differentiation of product} through its quality and through accompanied technical or marketing services which allows the firm/industry to command premium prices and fill profitable niches in the market.

\textsuperscript{21} Transaction costs take numerous tangible forms, including: travel costs, personnel time, communications costs, insurance costs, advertising and promotion costs, transport and storage costs, market research and consulting costs, arbitration, legal, and auditing costs, financial and other costs from delayed payments or delayed procurement, the costs of credit rating checks and product inspection services, costs incurred in safeguarding property, and actual losses from stolen goods, etc.

\textsuperscript{22} Ahmed and Rustagi (1985) recognize the importance of transaction costs and attribute a large part of the differential in marketing margins found in food markets in Asia and Africa to higher transaction costs incurred in the latter region.

\textsuperscript{23} A commodity system will be competitive in this regard if it enables firms and individuals to obtain higher returns (or some preferred combination of income and risk) than for alternative uses of the resources. This will normally be derived from an inherent or developed comparative advantage, although the commodity system may also be sustained by either temporary or longer-term protection or subsidies from government.

\textsuperscript{24} See, for example, Porter (1990) and Alavi (1990).
2.12 Porter argues that it is difficult, although not impossible to be both a lower cost and product differentiated supplier compared with one's competitors. This is because achieving the higher quality or level of service needed for differentiation can be very costly. While some technological or institutional methods may simultaneously reduce production and/or marketing costs and add scope for differentiation, Porter contends that competitors will imitate these innovations over the long run, forcing the firm or industry to choose which of the primary sources of competitive advantage to emphasize in its strategy.\textsuperscript{25} In the course of an industry's development, technical, economic, or other changes may lead to shifts from a strategy of low cost supply to one of differentiation (or vice versa). In a competitive environment, whether such a shift can be efficiently achieved may be the difference between industry (or firm) prosperity or bankruptcy. This perspective can be applied to patterns of development in food commodity systems.

2.13 In the context of export-oriented agriculture, it is important to recognize a third potential source of competitive advantage. This we may call complementary supply. This arises either when the seasonality of one's production complements rather than overlaps that of other producers or when one's own production faces far less seasonality or inter-annual variability than that of competitors. The commodity system may be in a position to service the 'off-season' market in major consumer countries, and/or capture short-term rents by expanding consignments in the face of production shortfalls in major producing/consuming countries (deriving from adverse weather, outbreaks of disease or pests, or other factors). Complementary supply is not a competitive strategy per se when considering medium-to-long-term trade development. Even when serving an 'off-season' market niche, a firm or industry must still position itself either as a low-cost or product-differentiated supplier.

Determinants of Competitiveness

2.14 What factors determine the comparative and competitive advantages of particular food commodity systems? In neoclassical trade theory a country's comparative advantage is associated with its human, physical, and financial resource endowments and the opportunity costs of using such resources to produce (and market) different goods and services. The focus is on comparative costs with countries having a comparative advantage in those industries which intensively use those resources in which the country is relatively well endowed. As noted above, competitive advantage may be based on product (and service) differentiation, rather than lower costs. The determinants of effective product differentiation are many, but may primarily include the quality of human capital and physical infrastructure, the effectiveness of technological development and application, and the receptiveness and competitiveness of consumer and intermediate markets.

2.15 In the trade and manufacturing industry literatures, it is now widely recognized that both comparative and competitive advantage are a product of various policy, technological, human capital, infrastructure, and management factors, in addition to given resource endowments. Table 2 draws on this literature as well as selected studies on agricultural competitiveness to outline a range of factors thought to be important in influencing commodity system competitiveness and growth.\textsuperscript{26} Such factors condition the incentives to invest in specialized commodity production and marketing activities, influence the likelihood of a supply response to such incentives, and determine the competitiveness of that supply response.

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\textsuperscript{25} At the same time, while stressing one strategy, a supplier cannot totally ignore the other. Unless the low cost supplier offers acceptable quality and service, its cost advantage may be nullified if substantial price discounts are demanded. The differentiated product supplier must control costs so that these do not exceed the premium prices which buyers or consumers are willing to pay.

\textsuperscript{26} See, for example, Alavi (1990), ABT Associates (1990), and ul Haque (1991).
Table 2: Factors Influencing Commodity Sector Competitiveness and Growth

(Internal) Market Demand Factors

| Income and Population Levels and Growth |
| Income and Price Elasticities |
| Consumer Tastes |
| Settlement and Work Patterns |
| Tariff/Non-tariff Barriers into Import Markets |
| Resources/Political Strength of Competing Suppliers |

Macroeconomic and Sector Policies

| Fiscal and Monetary Policies |
| Exchange Rate Policies |
| Trade and Licensing Policies |
| Price Policies |
| Labor Policies |

Natural Resources and Human Capital

| Land, Water, and Other Natural Resources |
| Climate and Sunlight |
| Skilled and Unskilled Labor |
| Entrepreneurial and Trade Experience |

Physical, Technical, and Social Infrastructure

| Transport Infrastructure |
| Communications/Utilities Infrastructure |
| Marketing Facilities |
| Agricultural Research and Extension |
| Post-Harvest Technology Research |
| Credit Facilities |
| Market Information |

Micro-Marketing and Coordination Elements

| Costs/Efficiency of Physical Marketing (Processing, Storage, Transport) |
| Costs/Efficiency of Buying + Selling |
| Coordination of Production + Marketing |
| (New) Product Development |
| Quality Control |
| Quantity Control for Sales and Market Power |
| Risk Sharing/Reduction Measures |
| Marketing Research and Promotion |

2.16 The scope for commodity system development and growth is intimately tied to the size and patterns of food demand and, in an international context, to the scope for entry into foreign markets. Major changes taking place 'outside' of food marketing systems, including increases in income, changes in taste, changes in work and living patterns, and new technological developments (e.g. refrigeration), strongly influence food demand and create both food marketing opportunities and challenges. Access to particular international markets may be blocked by tariff and non-tariff barriers, or, conversely, be facilitated by preferential treatment on the basis of historical ties or importer foreign policy objectives. Sustained import penetration may thus depend on political bargaining as much as economic competitiveness. Of course, international competitiveness will be strongly influenced by the resource endowments, experience, and political strength of firms and industries in other countries.

2.17 Macroeconomic and sector policies also have a very significant role in shaping the incentives for investment in production and marketing activities. Such policies strongly influence the costs and returns on farm inputs and food products, the relative prices among these products, and the conditions for entry into trade. A stable macroeconomic environment and improvements in that environment strongly influence investment decisions and hence long-term productivity. The incentive to invest and the cost competitiveness of a commodity

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27 This is the central thesis of Mares (1987).
sector will be undermined by high rates of inflation, high costs for capital, rising labor costs, and an overvalued exchange rate— all variables subject to influence from government policies.\textsuperscript{28}

2.18 While macroeconomic and pricing policies influence product costs and prices, there are important non-price characteristics of food products (e.g. nutritional properties, physical appearance, freshness, timely availability, packaging) which may be just as significant in international competitiveness.\textsuperscript{29} In addition, macroeconomic and sector policies do not determine the capacity and speed by which producers and marketing enterprises respond to changes in market and technological opportunities and hence, maintain competitiveness. These are determined more by organizational, institutional, and human capital factors.

2.19 As recognized in neoclassical trade theory, an important basis for comparative (and competitive) advantage is a country’s natural resource and human capital endowment. These are certainly important in influencing a country’s capacity to be competitive in the production and marketing of particular food products. To the traditional components of this category of resources we add entrepreneurial and trade experience which is vital to any effective marketing effort. In a particular commodity system, such experience can be acquired over time (e.g. ‘learning by doing’), transferred in from another local industry, or imported via a foreign or joint venture.

2.20 Well-developed physical and social infrastructure are the second category of goods which are required for an efficient supply response to the incentives provided by market opportunities and favorable macroeconomic conditions. Physical infrastructure such as roads, ports, telephone lines, power systems, railways, terminal markets, and storage and processing facilities are fundamental to a well-functioning marketing system. The same is also the case for the social infrastructure which develops and adapts technologies, provides training and information, and provides financing.

2.21 The final set of factors influencing international competitiveness relate to micro-marketing activities, the coordination of production with downstream requirements, and physical logistics. This is the management element of commodity system development—the management of physical resources and of interpersonal and organizational relationships. While typically ignored in economic analyses emphasizing quantity/price relationships, these management and coordination elements are central to commodity system operations and competitiveness. It is primarily at the farm and firm levels and in the interfaces between them where levels of productivity, product quality, and transaction costs are determined.

Generic Barriers to Entry and Coordination in Food Commodity Systems

2.22 Food products, raw materials, production, marketing infrastructure, and marketing services have intrinsic technical and economic properties which, particularly in developing countries, frequently lead producers and marketing entities to experience severe problems related to production and market risk, inadequate or asymmetric information, transaction costs, logistics, and overall marketing costs. Each can therefore serve as major barriers to production, exchange, and coordination in commodity systems. In this section, we briefly discuss some of these intrinsic problems in food marketing—problems which will commonly arise even in favorable policy environments.

\textsuperscript{28} See World Bank (1986) and Schiff and Valdes (1992) for global perspectives on the link between macroeconomic policies, sector policies, and agricultural performance.

\textsuperscript{29} See Alavi (1990) and Peters (1992) for more general discussions of non-price factors in industrial competitiveness.
Food Product Technical Characteristics

2.23 Compared with most other products, food products and raw materials are more bulky and perishable. Bulky commodities generate physical handling and transport problems related to the development and utilization of infrastructure capacities and to potentially high unit logistical costs. For very bulky goods, it may be necessary to establish processing facilities and the attendant power and water supply in close proximity to farm production areas. Perishability limits the marketable life as a fresh commodity and the period of time over which it can be used as raw materials for processing. Commodity perishability greatly limits the marketing flexibility of producers, enhances their market risks, and potentially places them in an unfavorable bargaining position vis-a-vis buyers who have alternative supply sources. Commodity perishability enhances risk of product loss or value decline during transport and storage, may necessitate investment in highly specialized and 'lumpy' transport and storage facilities and equipment, limits the role of storage in balancing supply and demand over time, and raises the risk of contamination in food processing. In addition to these losses or special costs, rapid perishability raises transaction costs since it requires that the raw materials or commodities be repeatedly screened or graded for quality at each level in the commodity system.30

2.24 While agricultural commodities are frequently regarded as being relatively homogeneous, food commodities and raw materials do exhibit considerable variability in their quality from unit to unit and from one supply period to another. Food commodities and raw materials tend to have multiple quality attributes, some of which are difficult to measure (or observe), and most of which are valued and weighted differently by specific groups of users and consumers. These features sometimes limit the scope for informative grading, create potential information asymmetries related to quality, and reduce the likelihood that market prices will signal complete information about the quality of these goods.31

Food Commodity Production Characteristics

2.25 The farm-level production of many food commodities and raw materials has features which render such production inherently risky, heighten transaction costs in a market setting, and inhibit effective coordination of production with downstream operations and consumption. First, compared with manufactured products, food products tend to be produced over a geographically more dispersed area and by individual producers who are smaller in scale and less specialized. This production pattern may result in high costs for crop intelligence and transmitting information to producers regarding consumer preferences. This production pattern also contributes to potentially high transportation costs in the collection of raw materials or animals, thus interrupting physical commodity flows. The output of a small producer may also be insufficient to warrant investment in proper storage facilities or standardized containers, perhaps leading to additional handling activities or requiring additional quality inspection. All of these imply added transaction costs.32

30 Selling highly perishable commodities on description poses risks for both sellers and buyers since their quality may deteriorate in the interim period before actual delivery.

31 As the quality of food directly affects human health, informational asymmetries are potentially quite serious. In the absence of labels which indicate the true contents of food products, their nutritional value, and other health implications, consumer choice may be poorly informed. On food quality and information asymmetry, see Caswell and Padberg (1992).

32 From the point of view of marketing agents, such added transaction costs are at least partly counterbalanced by the reduced risk of total supply failure (due to weather, disease, or pests) when production is geographically dispersed.
2.26 At the same time, small, dispersed producers may possibly face a situation of monopsonistic competition with only one or very few active buyers in their area. There is frequently a considerable mismatch between the efficient operating scales at the farm level and in subsequent processing operations. A market structure featuring a relatively large processor and multiple small suppliers may emerge with asymmetric information and considerable inequality of bargaining power. The mismatch in efficient operating scales serves as a barrier to forward integration by un-organized producers and requires the processor to develop multiple supply sources to enable it to utilize its full capacity. A coordination problem arises since the production schedules for different suppliers must be scattered over time rather than overlap one another.

2.27 A second common set of food production characteristics concerns the yield lag, yield uncertainty, and seasonality of production. The production of most food crops and animal products is dependent upon the life cycle of plants and animals. In some cases (e.g. tree crops; beef cattle), this life cycle involves an extended gestation period before commercial yields are attained. This creates a need for medium-term financing and presents a potentially considerable commercial risk for the producer. Agricultural production is inherently highly risky due to the important influence of weather and the possible incidence of plant diseases or pests. Adverse natural or man-made events can undermine total supply or the supply from one geographical area, resulting in farmer losses, un(der)-utilized marketing and processing facilities, and unmet consumer demand.33 The seasonality of crop and animal production creates problems for cost-efficient utilization of transport and processing facilities. For perishable commodities, processing requirements may make it necessary to extend planting and harvest activities into more risky production periods.

Production Support by Marketing Enterprises

2.28 Food marketing enterprises often have an important role in stimulating and directly supporting raw material production. They can do this by various means, including the supply of market and technical information, the supply of production financing, and the supply of certain material inputs (e.g. seeds, chicks, fertilizers). The incentives for marketing enterprises to provide such services will depend upon their ability to appropriate the benefits deriving from them; benefits such as increased output, enhanced product quality, and output better timed for marketing or processing requirements.34 The scope for appropriability of benefits will depend upon the nature of the goods/services themselves as well as the prevailing market structure.

2.29 For example, the dissemination of technical and market information has public good properties: such information is non-rival in its consumption and it is very difficult or costly to exclude individuals benefitting from the information without contributing to its cost. The marketing enterprise is unlikely to capture the full benefits from its supply of information since in a competitive environment, producers can utilize the information and then sell to a competing buyer. Where such 'free-riding' is widespread, there will be little incentive for private firms to provide more than minimal market or technical information. The provision of technical and market information may also be associated with so-called 'moral hazard' problems. The directed message may be biased toward the particular needs of the buyer rather than properly informing the producer about the wider range of technical and market options. The provision of technical information and the direct supply of production inputs can also give rise to negative externalities as when the recommended practices (e.g. heavy chemical use) adversely affect neighboring farmers or residents.

33 These unplanned variations in annual production levels may result in similarly wide swings in producer and consumer prices. If either producer incomes or consumer purchases are narrowly based, such price variations can have major welfare implications.

34 See Umali et al. (1992) and Jaffee and Srivastava (1992) for more detailed analysis of the incentives for private sector supply of selected agricultural inputs and services.
2.30 With respect to production financing, barriers arise due to limited collateral and asymmetric information. The producer is generally better informed than the marketing enterprise about his creditworthiness. The firm's ability to recover the loan may be better in a non-competitive than in a competitive market, since in the former case producers will have little or no alternative market outlet, enabling the lender to deduct the loan amount from the payments due for the commodity.

**Processing and Distribution Functions**

2.31 Several types of infrastructure, information, and other resources needed for efficient food processing and distribution functions have characteristics which may inhibit private investment in specialized activities, contribute to non-competitive market structures, and/or weaken the competitiveness of a commodity system. For example, certain types of infrastructure necessary for marketing have either public good properties or are subject to such large economies of scale as to result in natural monopolies in all but very large countries. Roads are an example of the former and rail and port facilities of the latter. Private firms engaged in food marketing will generally lack the capacity to invest in such facilities, the absence or poor quality of which will reduce producer incentives, raise marketing costs and restrain trade in certain directions.

2.32 While not featuring economies of scale as significant as for rail and port facilities, others types of marketing infrastructure do nevertheless entail 'lumpy' investments which can serve as a major barrier to entry. Investments in certain modern processing, storage, transport, and trading facilities provide the investor, at least initially, with an operational capacity far in excess of current supplies or supplies expected within a few years. The large unit operating costs in these initial years, together with uncertainty about future raw material or commodity supplies, may inhibit many private firms from undertaking such investments.\(^{35}\) In the absence of a well functioning stock or financial market, there may be few local means to pool the risk associated with such investments. Hence, in certain cases, private firms may not be able to perform the necessary risk-bearing function. For some infrastructure, there are also possible negative externalities as with the environmental effects of marketplaces and abattoirs.

2.33 Uncertainty will be especially strong for a new or highly specialized product which requires specialized processing or other facilities and equipment. In the short run, while supplies of the targeted product(s) are being built up, the specialized equipment may not be applicable to other, currently available, raw materials and commodities. Under such a condition of 'asset specificity', the processor/storer/transporter is locked-in to a certain type of operation and becomes vulnerable to the bargaining pressures of raw material suppliers and product buyers who possess alternative production, trading, or consuming options.\(^{36}\)

2.34 The processing, transport, and storage of raw materials and commodities takes time. The ability to participate in such activities thus depends on access to finance, both to pay for raw materials/commodities purchased and to cover the interest and other costs of goods held in storage or transit. The availability and cost of credit is thus an important factor in the entry and viability of firms and individuals in the marketing system.

\(^{35}\) The problem may be circular in that farmers may not expand production to levels which would make the marketing investment cost-effective without seeing tangible evidence of facility development. Economies of scale are also associated with the international transport of food products, with minimum quantities needed to fill individual pallets and containers or the full freight capacity of a ship, train, or plane. A certain minimum level of trade, on a consistent basis, may be necessary to attract those who provide international freight services in the first place.

\(^{36}\) On the issue of 'asset-specificity', see Monteverde and Teece (1982) and Williamson (1985).
Many private financial institutions have limited experience lending for agricultural marketing and processing. Limited recognized collateral and information asymmetries are again a potential problem.

2.35 Several additional functions are associated with economies of scale which may inhibit entry and therefore result in concentrated market structures. Both crop intelligence and market research feature economies of scale and scope with certain 'lumpy' investments in assets (e.g. computers, databases) and with advantages accruing to those with information sources in several locations and those trading in multiple commodities. Product promotion is also associated with economies of scale or scope, with a certain threshold level of trade and supply capability being necessary for such promotion to be worthwhile. There are both large sunk costs and large commercial risks associated with launching a new product, this again serving as a potential barrier to entry or sustained competitiveness.

2.36 Product promotion may also give rise to externalities, although this may depend upon the specificity of the promotion. Promotion of generic products (as opposed to individual brands) presents 'free rider' problems as some producers/traders can benefit from promotion without contributing to its costs. A related issue is the promotion of an overall industry or country within international markets. This too features economies of scale and externalities. For some product groups, especially fresh produce, there are potential advantages in promoting a national image for quality. This image or reputation is a public good: all firms in the industry are associated with it and new entrants into the trade inherit it. The reputation needs to be protected. The supply of substandard produce by one producer/exporter can jeopardize a whole commodity system's reputation, with adverse affects on market access or realized prices.

2.37 In an international context, transaction costs alone may serve as a major barrier to trade for many individuals and firms. In setting up a trade, exporters are likely to incur higher search and bargaining costs than domestic market traders. Physical distance to the target market(s) constrains access to information about trading opportunities, while an expectedly less dense information network will yield less complete information regarding the capabilities, financial solvency, and other characteristics of buyers or agents. Physical distance and/or language barriers may prevent face-to-face negotiations and contribute to an extended bargaining process. International traders may be unfamiliar with the standard trading practices in the opposite country and this may contribute to misperceptions about respective bargaining positions and tactics. Large geographical distances between traders increases logistical costs and risks and limit the scope for direct monitoring of trade partner performance. The enforcement of international contracts may prove very difficult and costly due to weak legal integration of countries and to the more limited scope for social group or trade association pressures on contract defaulters.

2.38 Table 3 summarizes some of the economic properties of major marketing infrastructure and functions. The table indicates that while relatively few of the facilities and services have public good properties, many are associated with externalities, economies of scale/scope, and/or moral hazard problems. Such properties, together with the important problems of risk, transaction costs, and logistics management might inhibit private investments in specialized production and marketing activities and/or reduce the degree to which such investments are privately and socially efficient. Table 4 summarizes the discussion in an alternative way by identifying possible gaps or bottlenecks in the flows of physical commodities, information, and/or financial resources within commodity systems which might stem from the inherent technical and economic characteristics of food products, production, processing, and marketing.

2.39 This analysis leads to the conclusion that while direct public sector involvement in the production and marketing of high-value foods can be economically justified in only very limited circumstances (e.g. in 'infant industry' contexts), the public sector may have important roles in commodity system development through the provision of physical infrastructure, the supply of market and technical information, the design and enforcement of standards (for inputs, products, and facilities), the implementation of programs and other measures to reduce or spread risks, and/or the encouragement of entry and competition.
Table 3: Economic Properties of Infrastructure and Functions Associated with Food Marketing

<table>
<thead>
<tr>
<th>Function/Facilities</th>
<th>Public Good Properties</th>
<th>Externality</th>
<th>Economies of Scale/Scope</th>
<th>Moral Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead Infrastructure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roads</td>
<td>x</td>
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<td>x</td>
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<tr>
<td>Rail and Port Facilities</td>
<td></td>
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<td></td>
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<tr>
<td>Marketplaces</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Power and Water Services</td>
<td></td>
<td>x</td>
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<tr>
<td>Production Support Services</td>
<td></td>
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<tr>
<td>Inputs Supply</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Finance</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Technical Info Supply</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Info Supply</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Post-Harvest Assessment/Transformation</td>
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<td></td>
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<tr>
<td>Crop/Production Intelligence</td>
<td></td>
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<td></td>
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<tr>
<td>Initial Grading/Selection</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Product Assembly</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Storage</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
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<tr>
<td>Quality Control</td>
<td>x</td>
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<tr>
<td>Processing</td>
<td></td>
<td></td>
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<tr>
<td>Marketing and Distribution</td>
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<tr>
<td>Local/Int'l. Transport</td>
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<tr>
<td>Wholesaling/Retailing</td>
<td></td>
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<tr>
<td>Market Research/Intelligence</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Product Promotion</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Standardization</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Country/Industry Promotion</td>
<td>x</td>
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</tbody>
</table>

Table 4: Generic Barriers to Commodity System Flows

<table>
<thead>
<tr>
<th>Problem/Barrier</th>
<th>Physical Product Flows</th>
<th>Informational Flows</th>
<th>Financial Flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodity Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulkiness</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perishability</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Production (Support) Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geographical Dispersion</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Unstable Production</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended Gestation Period</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Public Goods Nature of</td>
<td></td>
<td></td>
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<tr>
<td>Market/Technical Information</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Information Asymmetry in Credit</td>
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<td></td>
<td></td>
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<tr>
<td>Processing/Distr. Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale Econ./Public Goods Nature of Transport Infrastructure</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale Econ./Public Goods Nature of Communication Infrastructure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asset Specificity in Processing</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Asymmetry in Credit</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale Econ. in Crop Intelligence and Market Research</td>
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</tbody>
</table>

17
Technologies, Institutions, and Other Solutions to Generic Food Marketing Problems

2.40 A wide range of technical, institutional, and other measures can be adopted to facilitate the flow of information, goods, money, and product ownership rights in commodity systems, to achieve economies of scale and reduce the risks and transaction costs associated with food procurement and marketing, to internalize externalities, and to provide those public goods necessary for efficient market development. Many of these measures are essentially market or quasi-market responses on the part of private firms and individuals; others entail government interventions which stimulate, re-direct, constrain, or supplement private activity. While the available space here does not permit a comprehensive discussion of this wide array of technologies and institutions, this section does examine an illustrative sample of such measures, noting their potential for promoting improved efficiency, coordination, competitiveness, and other objectives.

Technological Measures \(^{37}\)

2.41 Certain technologies can be introduced at the production level which have strong marketing implications. For example, crop varieties can be developed and adopted which yield commercial harvests sooner, which have a more extended seasonal yielding pattern, and whose harvested product has improved storage, taste, and other properties. Certain cultivation practices and chemicals can induce or delay crop maturity. Production under controlled irrigation or under controlled temperature, lighting, and other conditions can again influence the timing or seasonality of production as well as the quality of raw material output. These (and many other) production technologies may reduce production risks, enable producers to diversify their crop/livestock mix, and facilitate closer coordination between production and subsequent processing or distribution activities.

2.42 There are a wide range of well-established or emerging technologies which can facilitate the post-harvest flow of food products and raw materials by countering their perishability and/or bulkiness, and thereby lowering the risks and/or costs of commodity storage and transport. These include controlled atmosphere storage and transport, advanced mechanical handling techniques, vacuum and polyethylene packaging, wax coating, irradiation, and containerization in internal and international transport. Computerized warehousing and computer monitoring of goods in transit can improve physical commodity and informational flows, plus provide early quality control warnings. \(^{38}\)

2.43 Many processing and related food technologies can facilitate improved physical product flows, counter the uncertainties and costs of raw material procurement, and enhance consumer demand. Many processing functions directly reduce the bulkiness of and perishability of raw materials. The use of ultra-high temperature

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\(^{37}\) Only a brief discussion is provided here on the many production, processing, storage, transport, and other technologies which can be adopted to facilitate more efficient food marketing and commodity system coordination. For more detailed coverage, readers are referred to the Economic Development Institute (1990-91) working paper series on agricultural processing technologies (edited by Brown) and the papers by Greeley (1991), the Economic Commission for Europe (1991), and Peters (1992) dealing with post-harvest technologies, food processing machinery, and logistics management, respectively.

\(^{38}\) Technologies can be introduced to more effectively measure the quality of raw materials before processing. This facilitates improved information and incentives to producers and enables processors to better sort raw materials for production of different types of products. Examples of such technologies include those which enable more accurate measurement of the fat content of meat, the color, sizing, and chemical make-up of fruit and vegetables, the moisture content of grains and raw sugar, etc.
processing, together with aseptic packaging, can extend the marketable life of ordinarily highly perishable commodities (e.g. 'long-life' milk). Some technologies enable the replacement of natural raw materials with tailor-made fat-, sugar-, beverage-, and other product substitutes. This obviates the need to coordinate processing with farm production. New processing technologies can facilitate greater uniformity of output, greater hygiene, or lower unit costs of production.

2.44 Still other technologies can facilitate improved monitoring of demand and improved communications between commodity system participants. Laser scanners at retail locations are an example of the former. Scanning not only speeds up retailer inventory management, but provides detailed information about the buying patterns of consumers: information which can be very valuable both to the retailer and to food manufacturers. Improved communications via facsimile, computer networks, and other devices can lower the costs of doing business and keep suppliers and buyers in up-to-the-minute contact regarding available suppliers, delivery times, prices, etc.

Laws, Rules, and Standards

2.45 All commodity systems operate within an institutional environment, consisting of a set of fundamental political, social, and legal ground rules. These ground rules establish the basis for production, exchange, and distribution. According to Ruttan and Hayami (1984, p.204), these ground rules "...facilitate coordination among people by helping them form expectations which each person can reasonably hold in dealing with others...[They] provide assurance respecting the actions of others and give order and stability to expectations in the complex and uncertain world of economic relations." The institutional environment governing a commodity system consists of several different types of rules, the most important being: 1) rules defining, allocating, and enforcing property rights (for example, property and bankruptcy laws); and 2) rules and conventions defining permissible and non-permissible forms of cooperation and competition (for example, standards, licensing rules, laws of contract and liability, company and cooperative laws, and 'fair trading' conventions).

2.46 A well articulated and consistently enforced system of property rights is a fundamental precondition for efficient exchange within commodity systems. Clarity over the ownership and the rights to use, trade, and alter assets is vital to market development since this assigns to individuals the rights to benefits (and the burden of losses) from specialized production and marketing activities (Bromley (1986)). The general system of property laws places boundaries on participant behavior and expectations and, in doing so, increases the scope for coordination.

2.47 Rules and conventions specifying entry conditions and boundaries on cooperative and competitive practices may also facilitate exchange and coordination. For example, The establishment and enforcement of standards can reduce transaction costs by increasing the available information to buyers and consumers. Standards, which may include basic weights, measures, and quality grades, provide farmers and marketing agents with a more exact language to communicate offers, a norm to compare actual with expected behavior, and a more detailed and objective view of the actual outcome. Quality standards may be mandatory or voluntary; they may be minimum standards or include multiple grades. They are especially important when trade takes place over large distances and among strangers as standardized goods can more easily be traded 'on description'.

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39 On standards and grades, see Kindleberger (1983), Bowbrick (1983), and Rottenberg and Yandle (1988).
2.48 The licensing of producers and marketing agents can also facilitate trade by reducing transaction costs. This would occur where the criteria for licensing centers around the asset-holdings, past experience, financial solvency, and other proxies for competence for the enterprises in question. In such cases, a public or collective authority would provide an initial screening of the capabilities and credibility of alternative suppliers and buyers. Performance incentives are built in since suppliers of substandard produce would risk revocation of license.

2.49 As food products become more complex and varied, consumers cannot be expected to have full knowledge about the choices available to them and the quality of products on offer. The food supplier has the incentive to supply just enough information that will differentiate its product(s) from its competitors, but no more. In order to enable consumers to make more informed decisions and to protect themselves from potentially harmful products and practices, regulations may be established requiring certain tests or inspections of products, certain handling or processing procedures, certain nutritional or other labels, and truth-in-advertising.

**Spot Marketing Trading**

2.50 The conception of market exchange found in most textbooks is one of an impersonal, one-time encounter between a buyer and seller of a standardized good or service. In such transactions, goods, services, money, and titles are transferred simultaneously: i.e. 'on the spot'. Trade takes place in goods which have already been produced with market prices serving as the primary source of exchange-relevant information, constraints, and incentives. Each of the participating parties make independent decisions based on their own conditions and preferences and on the available information about the preferences and behavior of others.

2.51 There are several potential advantages of spot market trading over more elaborate trading or organizational ties (Hayek (1945); Williamson (1985)). First, the market price system offers clear and powerful incentives. Prices automatically meter and reward productive effort and, unlike in the case of many alternative institutional arrangements, the distributional consequences of spot market exchange are not complicated by past or future considerations or by the provision of non-measured services. Second, trade in this mode offers wide scope for flexibility to respond to changes in market conditions as it is generally easier to negotiate an adjustment in price levels alone than to agree upon and implement changes in trading rules or lines of command. Third, market prices place clear and powerful constraints on individual behavior--factor prices provide budgetary constraints, while final goods prices provide purchasing constraints. In contrast, under alternative institutional arrangements, most behavioral constraints must be negotiated and supervised. Finally, in a competitive environment, spot market trading provides informational economies with market prices 'summarizing' all or most of the information which transactors require to conduct trade.

2.52 Spot market transactions can occur across several different types of markets, including auctions, private treaty, and posted price (Cassady (1974); Marion et al. (1986)). Auction markets feature an impersonal competitive bidding process which 'discovers' the market price. Auctions provide for very low transaction costs when large quantities of standardized products are traded. They also provide for great flexibility of prices which tend to change from minute to minute. If the auction is well supplied, trading may provide up-to-date information on supply and demand conditions. Auction markets generally feature standardized procedures for the exchange of payments for and title to goods.
Reputations, Brand Names, and Advertising

2.53 Reputations are one means of signaling competence and credibility. The reputation of an individual (or firm) will incorporate perceptions about the quality of the goods/services he offers, the trustworthiness of his words and actions, his competence, and various other real or mythical aspects of his character and behavior (Casson (1982)). 'Good' reputations reduce the costs of arms-length trade as buyers and sellers will have greater confidence in one another, permitting them to lower their initial screening efforts and subsequent monitoring of product quality. In contrast, when a firm or individual has a 'bad name', this is a signal to other parties either to pass up potential trades or else to closely monitor product quality, ask for prepayment for goods, and employ other defensive techniques. Reputations, both good and bad, provide a proxy for a large amount of information which may not be readily available to potential trading partners. A 'good' reputation may facilitate entry into new markets and can spillover onto other goods and services which its bearer may provide.

2.54 One means of facilitating this spillover of reputation effects is to develop and promote a brand name, either for a company or a country. Where the link between producers and ultimate consumers is weak or non-existent, the reputation of the seller and his brand name may serve as an effective proxy for quality. The brand name establishes responsibility for the product, thus increasing the scope for compensation should quality be substandard (Demsetz (1964). Branding not only helps in the introduction of new products, but helps to forestall consumer substitution of the product with cheaper items. Advertising is another direct means of providing information to buyers and consumers and of persuading them of the merits of generic or branded products. Advertising can support the growth of firms and of markets and therefore contribute to the realization of economies of scale.

Personalized Trading Networks

2.55 Actual market relations frequently differ from idealized markets in that each established buyer and seller frequently develops groups of suppliers or customers with whom they are more inclined to deal with than anyone else. Through experience, each market participant locates specific parties with whom they have confidence in and with whom personalized, repetitive trading relationships develop under the aegis of unwritten, informal understandings. Such repetitive trading helps to reduce information costs and, with the development of norms and the build up of trust, reduces bargaining, monitoring, and enforcement costs (Wilson (1980)). In examining the 'bazaar economy' Geertz (1978) noted the importance of 'clientization' (e.g. the pairing of buyers and sellers in recurrent transactions), in reducing information costs in an uncertain trading environment. Richardson (1964) notes a similar process whereby buyers and sellers who are loyal to one another may obtain favorable attention or services, such as priority in times of product scarcity.

2.56 In environments in which formal (e.g. legal) procedures for monitoring and enforcing agreements are absent or inadequate, the generation of trust and the build-up of relationships based on reciprocity are likely to be crucial factors in the development of trade: they serve as a proxy for laws (Posner (1980)). Trust can allow transactors to build flexibility into their trading relationships since adjustments can be made sequentially with less risk of information distortions (Macauley (1963). The parties are aware that opportunistic behavior can undermine the basis of trust and therefore threaten the privileged trading status which each holds. Trust and reciprocity can enable trade to take place even in a very uncertain and unstable economic environment.40

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40 Some analysts, particularly in socio-anthropological studies of marketing, have observed the development of 'insider trader networks' based on ethnicity, kinship, or other personal or corporate ties. In such cases, mutual conceptions of fairness and reciprocity exist. Within the group there is extensive flows of information,
Brokerage

2.57 Brokers are intermediaries who do not take title over the commodities traded, but who link suppliers and customers. They are commonly found in agricultural markets and in all forms of international trade. For several reasons, brokered trade can be less costly for suppliers and customers. First, as regular players in the market, brokers are likely to be better informed about market conditions than the buyers, sellers or both. Brokers can assist buyers and sellers in sifting through and selecting the data relevant for them to make proper decisions. Second, a broker may have the social standing, experience, and bargaining skills to effectively bring together buyers and sellers from different locations, clans, or social settings. The broker, who cultivates the trust of both buyer and seller, can bring an element of personalization to trades between parties which do not know or directly communicate with one another. Third, brokers can achieve economies of scale in deal-making by accumulating small supplies/offers from many parties and selling to many other parties. Use of a broker may enable a supplier (or buyer) to stabilize his sales (or purchases) given the plethora of market outlets (and supply sources) which the broker can offer.

Contract Coordination

2.58 Contract coordination represents an intermediate institutional arrangement between spot market trading and the vertical integration of production and marketing functions (Mighell and Jones (1963); Macneil (1975); Goldberg (1976). It can provide many of the benefits of integration, while still enabling its participants to retain at least some degree of autonomy. Market and production contracts formalize a degree of continuity or futurity in a trading relationship, covering a production cycle, a marketing season, or a longer time period. In contrast with spot market exchange, the agreed exchange is in promised goods and services rather than in already produced goods/services. Contractual details can vary enormously as can the overall intensity of the contractual relationship.

2.59 Two generic types of contracts can be identified, namely:

a) **forward market contracts** involving future commitments by sellers and buyers to sell and purchase a particular commodity at or over a stated time period. Such contracts specify either particular weights or volumes of the commodity to be exchanged or else some minimum or maximum quantities. Specifications are also generally made regarding quality attributes. Pricing arrangements vary, although agreements are generally made on the basis of fixed prices or a formula for determining price upon delivery. Forward market contracts are commonly made between farmers and first-handlers, between exporters and importers, and between wholesalers or manufacturers and retailers.


41 Information relevant to marketing decisions is generated as a by-product of trading activities and is thus more easily and readily acquired by those actors continuously engaged in trade.

42 Many individual suppliers and customers may not conduct levels of trade which are sufficient to warrant investment in the skills, contacts, and data needed to identify and negotiate deals with others.

43 One variant is futures market contracts where actual deliveries of the commodities are rare and where one contractual obligation can be countered by another one for the same commodity.
b) **forward resource/management contracts** which combine forward market sale and purchase commitments with stipulations regarding the transfer and use of specific resources and/or managerial functions. In such cases, the exchange of the raw material/commodity is made contingent upon the application of specified inputs and/or methods, while the buyer or seller may act to advise, supervise, or take over the management of particular production or trading activities. Such arrangements, which internalize some though not all product and factor transactions, are found in many sub-contracting (Mead (1984)), franchising, distributorship, and marketing/management agreements (Casson (1987)) and many contract farming schemes in agriculture (Wilson (1986); Watts et al. (1988); Glover and Kusterer (1990).

2.60 Both of these arrangements can serve as an effective vehicles for buyers to transfer complex information to sellers regarding their future delivery time, location, and quality preferences. This can be done through direct specifications or by erecting price schedules according to timing, quality, etc. By creating a forward market, these contracts may reduce the uncertainty of buyers regarding access to supplies and the uncertainty of sellers regarding access to markets. Such arrangements can also reduce the price and/or income risks of one or both parties, although this will depend upon the pricing methods used and the actual sources of price instability. Forward resource/management contracts can also serve as a means of transferring complex technical information, production inputs, and credit despite prevailing market imperfections in these areas (Minot (1986)). Production contracts can sometimes also be used as a form of collateral by farmers seeking credit from third parties.

**Cooperatives/Associations/Voluntary Chains**

2.61 A cooperative enterprise, association, or voluntary chain of stores is formed by a group of economic entities who agree to act collectively in order to further their joint and own private interests. Such enterprises or associations can be formed by farmers, processors, wholesalers, retailers, or exporters, in order to undertake joint investments, common practices, or collective self-regulation of competition. The members essentially enter into a series of explicit and implicit contracts with one another, agreeing to certain membership terms and agreeing to certain standard operating procedures (Staatz (1984); Zusman (1989)).

2.62 Voluntary cooperation can support commodity system investment and coordination in at least the following ways:

a) it can **counter the problem of 'lumpy' investments** in marketing infrastructure and services since the fixed costs of such investments can be spread among the group members.

b) it can serve to **internalize certain externalities** and allow for private provision of certain public goods. One area for this is in product promotion which may not be worthwhile for an individual producer or trader, but profitable for a group since costs could be spread and benefits internalized. A group or association can also serve to promote and protect an industry’s reputation for quality, reliability, etc. by monitoring its members and punishing (perhaps through loss of membership) those parties which provide substandard service to buyers/consumers.

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44 This discussion is based on Staatz (1984), Shaffer (n.d.), Coleman (1987), Schneiberg and Hollingsworth (1990), and Smith and Thomson (1991).
c) it can reduce or pool member risks by guaranteeing commodity purchases and sales on behalf of members, and by providing insurance and/or credit to members. When performing the sales function, the cooperative will pool the market price and access risks of members. Cooperatives or associations may be better placed to provide insurance and credit to members because of having more detailed and reliable information about their risks and creditworthiness.

d) it can lower transaction costs for members and for non-members trading with members by settling disputes and by obtaining, interpreting, and disseminating information about production, markets, and farmer/trader competence and creditworthiness. A trade association can be an important 'first stop' for a prospective buyer of an industry's output and can provide a channel for consumer/buyer complaints. A farmers' cooperative can synthesize information about its members' production and be used as a low-cost channel for information from processors or traders.

e) it can serve to exercise or counter market power for its members through collective negotiations with suppliers or buyers, by controlling/withholding member supply into the market, and by informing members about prevailing terms of trade.45

Vertical Integration

2.63 Vertical integration involves the combination of two or more separable stages of production or marketing under common ownership and management. It can take place via simultaneous investments in multiple, interlinked activities or through investments 'forward' or 'backward' to existing activities. Vertical integration can be complete or partial, the latter involving at least some sales or purchases of the focal intermediate products or services to or from outside parties. The economics literature stresses four major rationales for vertical integration, each being potentially relevant in the context of food commodity systems.

a) Production/Logistical Economies: Vertical integration may reduce logistical costs associated with the procurement of raw materials and/or the sale of finished products. Where vertical integration involves bringing together in one location formerly distinct operating units, transport costs can be saved, particularly for bulky and perishable raw materials. Bringing under one management the suppliers and users of a raw material or other intermediate input can reduce the levels of required inventories because internal planning allows for a better match of supply and demand in terms of quantity and location.

b) Transaction Cost Economies: With vertical integration information costs can be saved as the firm becomes the sole or predominant supplier to itself for certain goods and services (Coase (1937; Williamson (1979). Bargaining costs are saved as the firm engages in relatively few long-term employment contracts instead of many more short-term hiring and supply agreements. Streamlined information systems provide ample scope for transmitting complex non-price directives within the firm. Centralized decision-making within the firm provides scope for rapid adjustments to changing technical or market conditions. Adaptations can be made in a sequential way without having to consult, revise, or renegotiate agreements with other firms.

45 The former two methods are most effective when the organization accounts for a large proportion of total supply—the organization provides a means of implementing cartel arrangements, thereby raising or stabilizing profits and shifting the burdens of adjustment on to other parties.
c) **Risk-bearing Advantages**: Vertical integration may be a very effective institutional means of overcoming problems of risk and uncertainty (Arrow (1975)). By internalizing flows of intermediate inputs, the firm may be able to eliminate certain risks such as variability of supplies, outlets, and quality, and the unauthorized use of technical information. More direct control over goods and assets can be exercised than under any arms-length or voluntary cooperation scheme. This reduced uncertainty may render the integrated firm better able to invest in highly specialized processing and marketing facilities and to take advantage of potential economies of scale. Partial integration (as with nucleus estate and outgrower schemes) may provide an even better combination of flexibility and risk-reduction or -sharing (Carlton (1979)).

d) **Advantages in the Presence of Market Imperfections**: In the early stages of market development when certain production or marketing functions remain slow in developing, vertical integration of multiple stages may be necessary to both stimulate consumer demand and guarantee the availability of the commodity (Stigler (1951). In the presence of taxes, price and exchange controls, and other regulations, the mere act of internalizing transactions may provide pecuniary gains as the firm. Governments treat market transactions differently from those which occur within firms. Vertically integrated firms may thus be able to bypass or minimize the effects of taxes and market controls. Finally, vertical integration may enable the firm to increase its market share and its leverage vis-a-vis suppliers and customers.  

**Government Intervention**

2.64 In circumstances where private supply of goods and services remains below the social optimum and where market, contractual, and cooperative mechanisms fail to effectively coordinate production and marketing activities, there may be justification for government interventions. Interventions by the State can reduce the risks and transaction costs faced by private firms and individuals, can compensate for missing or deficient markets, and can influence the organization and performance of commodity systems so as to enhance the benefits to the country or to particular interest groups (e.g. consumers, farmers, manufacturers). Government intervention need not entail direct government provision of goods and services. Regulation, taxation, and subsidization are

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46 Invoice or transfer prices within the firm can be used to minimize the impact of fiscal interventions such as exchange controls on capital, ad valorem tariffs, and sales or company taxes. On the pecuniary gains from vertical integration, see Koutsoyiannis (1982) and Casson (1984).

47 An integrated firm may be able to exclude others from segments of a market, exercise substantial leverage over non-integrated competitors, suppliers, and customers, raise the amount of capital needed to enter a market, and/or facilitate product differentiation and price discrimination (Comanor (1967)).

48 In theory, governments have certain advantages over private or cooperative entities when it comes to investment and coordination (North (1986)). Governments possess the unique powers of taxation and legitimate coercion. Such powers, together with certain economies of scale in utilizing these powers, potentially enable governments to better control against 'free riders', to better internalize externalities, and to better constrain individual behavior. Governments also have a better capacity to bear economic or financial risk since they can spread risks over a larger number of people and over a broad range of sectors or investments. Nevertheless, governments operate in the same uncertain environment as do private entities and their capacities to obtain and interpret the relevant information may not be better. Governments face potentially large political risks and their powers of taxation and coercion are constrained by the threat of competition from internal contenders, by dissent, and by private and corporate evasion of controls and taxation.
alternative modes of intervention. As relatively few food marketing activities have public good properties, it is these types of interventions, rather than direct government participation, which are usually more appropriate.49

2.65 The government has certain fundamental roles to play, these being either areas where only a sovereign body has the legitimacy or capability to act or areas where, for economic or technical reasons, the private sector will have insufficient incentives to provide a good or service at socially optimal levels. One of these fundamental roles lies in the definition and consistent enforcement of a reasonable set of property rights and regulations pertaining to acceptable and non-acceptable competitive and cooperative actions. Such property rights and regulations should not only facilitate production and trade, but also protect consumers against misleading claims and health-threatening foods.

2.66 A second fundamental role of government is to negotiate and define the rules for international trade and market entry. Governments can negotiate, either in bilateral or multilateral forums, to facilitate a particular commodity transaction (e.g. a deal with a state importing company) or to arrange longer term access for national firms to foreign markets on terms equal or superior to those accorded to competitive suppliers. At the same time (and usually under the influence of domestic interest groups), governments must determine the general rules for foreign entry into domestic input, financial, and commodity markets. Such rules will influence the competitiveness of food commodity systems vis-a-vis imported products as well as the availability and costs of production and other resources.

2.67 A third fundamental role of governments is to directly undertake or support the provision of goods and services which have public good properties, give rise to significant externalities, or feature economies of scale which are so significant as to result in natural monopolies. This pertains to several forms of physical and social infrastructure, including roads, rail and port facilities, power and water systems, technical research and training, and selected quality control and market information services. Because of the inherent economic properties of such goods and services, private supply may not be profitable or at least may not result in a socially optimal level of supply. While many governments have directly provided such goods and services, other options are to subsidize private supply, contract out supply to the private sector (thus assuring payment for services), or provide particular private or cooperative organizations with exclusive supply rights (e.g. on utility supply) or coercive powers (e.g. on quality control).

2.68 There are many other common types of government interventions in commodity systems. While of a less fundamental nature, these interventions can serve to counter market imperfections, reduce or alter the distribution of risks, influence the volumes and prices of traded products, and/or influence the distribution of opportunities and income. Comments follow on a sample of such common interventions.

2.69 Governments sometimes attempt to compensate for missing or deficient markets. This is particularly common in the area of credit where risk factors and major information imperfections are at play. Weak credit markets may result in limited funds available for small-scale farmers, cooperatives, and commodity traders, and for farmers and firms seeking to invest in assets carrying long gestation periods or being 'lumpy' in character. Being less risk-averse, governments may be better positioned to extend credit for these and other commodity

49 The space available here does not permit a comprehensive discussion of the roles and alternative modes of intervention by governments in food marketing and commodity system development. Our objective here is merely to highlight a series of fundamental roles for government and examine several additional common government interventions which affect food commodity systems.
system participants. An 'infant industry' argument for government support may be applicable in the early stages of development of particular commodity systems.

2.70 Another service commonly provided by governments is price stabilization. Stabilized prices can be regarded as a public good for farmers, consumers, processors, or other commodity system participants. Price stabilization—involving such instruments as price controls, floor prices, buffer stocks, variable taxes, and quantity controls—is ostensibly undertaken in order to lower the risks and stabilize the incomes of producers and/or consumers. However, price stabilization is often very costly to undertake, generates allocative distortions, and can adversely affect producer or trader incentives.

2.71 Still other government interventions are geared toward influencing the competitive structure of markets, thereby affecting the volume and value of trade and the distribution of income. Regulations may be geared toward promoting or protecting a competitive market structure or conversely, toward promoting the concentration or monopolization of trade. The former would be more common in a domestic market setting—in the interface between farmers and processors or at wholesale or retail levels. The latter is more common in export-oriented industries where economies of scale and improved bargaining power can be achieved through some degree of trade concentration.

2.72 Where voluntary cooperation fails to control 'free riders', capture the benefits from scale economies, or enable suppliers to exercise market power, governments can institute schemes for compulsory cooperation. The most common and well-documented forms of compulsory cooperation are one-channel procurement and sales through marketing boards, and supply and pricing controls through marketing orders (Jesse (1979); Hoos (1979). Both marketing boards and marketing orders can be used to control physical commodity flows, enforce quality standards, and pool market risks.

2.73 With monopoly export marketing boards, an entire commodity system can 'behave' like a single firm vis-a-vis the world market, regulating the mix and quality of products going to different markets and negotiating with transporters and buyers with a single voice. While export marketing boards can achieve certain economies of scale, pool producer and processor risks, and provide a means for asserting or countering international market power, the boards can become a major barrier in the flow of information between foreign buyers and local producers and processors. In addition, export marketing boards can become either the tool of certain vested interest groups (e.g. the political leadership, influential farmers, or processors) or an unstable arena in which various interest groups battle over policies and the spoils of trade (Bates (1981); Arhin et al. (1985)). In either case, marketing board policies may result in reduced production incentives and a processing and marketing strategy which is not demand-oriented and thus not sustainable in a competitive world market.

2.74 Table 5 summarizes this discussion by indicating whether the noted technologies or institutional mechanisms facilitate improved commodity and other flows, reduce raw material procurement and market risks, internalize externalities, etc.


51 In circumstances where supply variability is considerable, price stabilization may further destabilize producer, trader, and/or consumer incomes. See Newberry and Stiglitz (1981).

52 Instead of stabilizing prices with large-scale interventions and controls, it may be more efficient for governments to support producer risk-spreading/reducing strategies (e.g. crop diversification, non-farm employment, irrigation development) through credit, technical support, and other programs and to provide targeted food subsidies to vulnerable consumer groups (e.g. children).
Table 5: Technological/Institutional Measures to Facilitate Commodity System Coordination, Efficiency, and Market Power

<table>
<thead>
<tr>
<th>Technology or Institution</th>
<th>Improve Info Flow</th>
<th>Improve Product Flow</th>
<th>Improve Money Flow</th>
<th>Improve Flow of Title</th>
<th>Reduce Raw Material Procurement Risks</th>
<th>Reduce Market Risks</th>
<th>Internalize/Counter Externalities</th>
<th>Achieve Economies of Scale</th>
<th>Gain or Counter Market Power</th>
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<td><strong>Technologies</strong></td>
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<tr>
<td>Production Technologies Varieties, Irrigation, Etc.</td>
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<td>Yes</td>
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<td>Yes, Yes</td>
<td>Yes, Yes</td>
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<td>Standards/Grades</td>
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<td>Yes, Yes</td>
<td>Yes</td>
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</table>
III. Synthesis of High-Value Food Commodity System "Success Stories"

3.1 This section reviews and synthesizes the development experience, organization, and performance of the fifteen focal commodity system "success stories" listed in the Introduction. It examines selected dimensions of commodity system performance, their bases for competitive advantage, the international market environment and domestic macroeconomic/human capital/infrastructure conditions under which commodity system development has taken place, the common and varied forms of government support and intervention, organizational patterns, and the role of foreign capital and technology.

Selected Dimensions of Commodity Systems Performance

3.2 As discussed earlier, there are many criteria against which the performance of food commodity systems can be assessed. These include indicators of 1) operational, allocative, and transactional efficiency, 2) market development (volumes and values) and market shares, 3) product quality and variety, 4) marketing service quality, 5) profitability at farm, processing, and trade levels, 6) the levels and types of employment, 7) the distribution of income and risk, and 8) innovativeness and adaptability. Both the limitations of space and the absence of comparable data for several of these criteria lead to a focus here on long-term patterns of growth in high-value food production, trade, and world market shares, although several additional performance criteria (such as cost competitiveness, product quality and differentiation, local market development, and employment-generation) are also briefly addressed here and in the Appendix.

3.3 With the exceptions of China, Thailand, and perhaps Brazil, the 'successful' commodity systems are drawn from countries whose overall agricultural performance over the past quarter century has not been especially notable. In fact, long-term agricultural growth has been slower in many of these countries than in low- and middle-income countries more generally. This is illustrated in Table 6. Only Israel (for the 1965-80 period), China (for the 1980s), Chile (for the 1980s), and Thailand (for 1965-89) have experienced agricultural GDP growth rates well above those of developing countries as a group.

<table>
<thead>
<tr>
<th>Country(s)</th>
<th>1965-1980</th>
<th>1980-1989</th>
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<tbody>
<tr>
<td>Argentina</td>
<td>1.4</td>
<td>0.3</td>
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<tr>
<td>Brazil</td>
<td>3.8</td>
<td>3.0</td>
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<tr>
<td>Chile</td>
<td>1.6</td>
<td>4.1</td>
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<tr>
<td>China</td>
<td>2.8</td>
<td>6.3</td>
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<tr>
<td>Israel</td>
<td>5.5</td>
<td>2.4</td>
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<tr>
<td>Kenya</td>
<td>5.0</td>
<td>3.2</td>
</tr>
<tr>
<td>Mexico</td>
<td>3.2</td>
<td>0.8</td>
</tr>
<tr>
<td>Taiwan (China)</td>
<td>2.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Thailand</td>
<td>4.6</td>
<td>4.1</td>
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<tr>
<td>All Low-Income Countries</td>
<td>2.6</td>
<td>4.0</td>
</tr>
<tr>
<td>All Middle-Income Countries</td>
<td>3.4</td>
<td>2.6</td>
</tr>
<tr>
<td>All Low-/Middle Income</td>
<td>3.0</td>
<td>3.3</td>
</tr>
</tbody>
</table>

a Rates of change in agricultural production quantities only.

3.4 Rapid agricultural growth in both China and Thailand has been broadly based, covering livestock, horticultural, grain, and fisheries sub-sectors. The four commodity systems examined here for these countries could have been supplemented by additional 'success stories'. Agricultural growth in Brazil has also been fairly broad based, with several different sub-sectors experiencing considerable export growth. In contrast, much of the dynamic growth in Chilean agriculture since the mid-1970s has been accounted for by a single sub-sector: that of temperate fruits. While the importance of agriculture in the Taiwanese economy has declined steadily, that of the food processing industry has increased with its share of GDP and employment now matching that of agriculture. The other countries covered in this survey have featured a stagnation in many of their traditional agricultural sub-sectors.

3.5 Long-term trends in total food production for the case study countries are somewhat better than the trends in agricultural GDP growth, although they also are not exceptional compared with developing countries in general (Table 7). For Argentina, Chile, and Israel, rates of growth in total food production have lagged behind growth rates for middle-income countries as a group through the 1960s, 1970s, and 1980s. Of the focal countries, only Brazil, China, and Kenya experienced growth rates in food production during the 1980s which exceeded comparative international norms.

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Food Production</th>
<th>Case Study Commodities</th>
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<tbody>
<tr>
<td>Argentina</td>
<td>2.6</td>
<td>2.6</td>
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<tr>
<td>Brazil</td>
<td>4.1</td>
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<tr>
<td>Chile</td>
<td>2.4</td>
<td>1.9</td>
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<tr>
<td>China</td>
<td>5.9</td>
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<tr>
<td>Israel</td>
<td>3.3</td>
<td>1.7</td>
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<tr>
<td>Kenya</td>
<td>3.5</td>
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<td>Mexico</td>
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<tr>
<td>Taiwan (China)</td>
<td>4.4</td>
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<td>Thailand</td>
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</tbody>
</table>

NA. Complete data not available.

Sources: FAO World Crop and Livestock Statistics, 1948-85; FAO Production and Trade Yearbooks; Case Study Sources
3.6 In addition to providing data on growth rates for total food production in the focal countries, Table 7 also indicates the rates of growth in production volumes (or export volumes where production data are not available) for the case study commodities. In virtually all cases, production (or export volume) growth for the focal commodities has far exceeded that for total food production. For two-thirds of our cases, there has been double-digit growth in production (or exports) for a decade or more.

3.7 Each of the focal commodity systems have been successful in international markets, as evidenced either by a long-term development of trade and market shares covering several decades or by a surge in exports over the past decade in response to new market opportunities. These long-term or more recent export development patterns are discussed and illustrated graphically in Appendix. Table 8 below provides a summary of export performance patterns over the past two decades, signifying rising export values, world market shares, and commodity shares in total food exports.

3.8 The table shows that in 1970, exports in most of these commodity systems were either very small or nonexistent. Only in the cases of Israel citrus, Brazil FCOJ, Argentina beef, and Taiwan (China) canned vegetables did exports exceed $50 million and world market shares exceed 10%. The 1970s witnessed a major expansion in exports and world market shares in many of these cases, the most dramatic growth occurring for Brazilian and Argentine soybeans and soybean products, Brazilian FCOJ, Chilean fish products, and Taiwanese fish and canned vegetables. While export growth slowed in a number of the focal commodity systems during the 1980s, initial or secondary export booms were experienced in Chilean fruit and fish, Brazilian FCOJ, Chinese shrimp, Taiwanese pork products, and Thai poultry, tuna, and shrimp. By 1988/89, the focal commodity systems generated combined exports worth $11.1 billion, representing more than 20% of the total exports of high-value foods by mid- and low-income countries.

3.9 With only a few exceptions, world market shares for the focal commodity systems have increased since 1970 or 1980, the largest increases occurring for Chilean grapes, Brazilian FCOJ, Thai tuna, and Argentine and Brazilian soybeans/soybean products. Brazil has taken over from the United States as the dominant world exporter of FCOJ. In less than ten years, Thailand went from a non-exporter of canned tuna to the supplier of nearly 50% of the world's rapidly expanding trade. During the 1980s, China and Thailand experienced the world's most significant expansions in shrimp exports and together now account for more than one-fifth of total world trade.

3.10 Again with only a few exceptions (e.g. Argentine beef, Taiwanese canned vegetables, and Brazilian soybean products during the 1980s), the focal commodity systems have increased or maintained their shares of national food exports over the past two decades. This is a sign of their long-established or recently developed comparative advantage within domestic agriculture and agro-industry. For several of the countries, the focal commodity systems account for a large share of national food (and beverage) exports, as in Chile (81%), Taiwan (73%), Israel (60%), Argentina (29%), Thailand (25%), and Brazil (24%).

3.11 To what extent are the focal commodity systems exceptional within the wider patterns of agricultural export development in the countries examined? For Chile, Taiwan (China), Mexico, and Kenya, the focal subsectors can be regarded exceptional performers, particularly if one extends the latter two subsectors to include
a broader range of fresh and processed horticultural products. For Israel, agricultural export success has also centered around fresh and processed horticultural products with the citrus subsector remaining the core. Nevertheless, that country has also developed a small, but successful trade in high-quality meat products. Argentina conducts relatively large export trades in cereals, fish products, and fruits and vegetables, although the volume and value of this trade has either stagnated or declined during the 1980s. Argentina's soybean commodity system has far outperformed that country's traditionally strong cereals sub-sector over the past two decades (Box 1). Thailand's agricultural export success extends beyond the focal commodity systems to include fresh and processed tropical horticultural products, rice, and processed cassava (for feed). Agricultural export success has also been broadly based in Brazil and China, with each country having export trades exceeding $100 million for six of our eight focal categories of high-value foods.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Mexico Tomatoes</td>
<td>26.6</td>
<td>185.4</td>
<td>243.1</td>
<td>13.1</td>
<td>16.6</td>
<td>15.3</td>
<td>5.6</td>
<td>9.7</td>
<td>8.6</td>
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<tr>
<td>Kenya Vegetables</td>
<td>2.3</td>
<td>17.6</td>
<td>47.7</td>
<td>0.1</td>
<td>0.2</td>
<td>0.4</td>
<td>1.8</td>
<td>3.1</td>
<td>7.4</td>
</tr>
<tr>
<td>Chile Grapes</td>
<td>4.0</td>
<td>51.8</td>
<td>315.1</td>
<td>2.4</td>
<td>7.3</td>
<td>21.4</td>
<td>7.2</td>
<td>7.6</td>
<td>16.8</td>
</tr>
<tr>
<td>Apples</td>
<td>3.5</td>
<td>74.7</td>
<td>129.1</td>
<td>1.1</td>
<td>5.3</td>
<td>8.1</td>
<td>6.3</td>
<td>10.9</td>
<td>6.9</td>
</tr>
<tr>
<td>All Fruit</td>
<td>11.8</td>
<td>168.7</td>
<td>582.3</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>21.3</td>
<td>24.7</td>
<td>31.1</td>
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<tr>
<td>Chile Tomato Paste</td>
<td>0</td>
<td>2.3</td>
<td>48.8</td>
<td>0</td>
<td>0.6</td>
<td>4.5</td>
<td>0</td>
<td>0.3</td>
<td>2.2</td>
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<tr>
<td>Korea Fresh Citrus</td>
<td>86.1</td>
<td>231.1</td>
<td>177.5</td>
<td>12.3</td>
<td>8.5</td>
<td>5.3</td>
<td>49.1</td>
<td>35.7</td>
<td>21.5</td>
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<tr>
<td>Proc. Citrus</td>
<td>37.0</td>
<td>124.0</td>
<td>322.0</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>21.1</td>
<td>19.1</td>
<td>39.0</td>
</tr>
<tr>
<td>Brazil FCOJ</td>
<td>147.3</td>
<td>338.7</td>
<td>1144.3</td>
<td>18.4</td>
<td>65.5</td>
<td>73.3</td>
<td>8.5</td>
<td>3.6</td>
<td>11.6</td>
</tr>
<tr>
<td>Argentina Beef</td>
<td>239.7</td>
<td>566.8</td>
<td>313.0</td>
<td>13.1</td>
<td>6.4</td>
<td>2.5</td>
<td>18.2</td>
<td>10.9</td>
<td>5.3</td>
</tr>
<tr>
<td>Canned Meat</td>
<td>135.3</td>
<td>278.9</td>
<td>263.3</td>
<td>14.9</td>
<td>9.7</td>
<td>7.7</td>
<td>10.3</td>
<td>5.4</td>
<td>4.2</td>
</tr>
<tr>
<td>Thailand Poultry</td>
<td>0</td>
<td>32.5</td>
<td>236.3</td>
<td>0</td>
<td>1.3</td>
<td>7.6</td>
<td>0</td>
<td>1.1</td>
<td>4.3</td>
</tr>
<tr>
<td>Thailand Tuna</td>
<td>0</td>
<td>0</td>
<td>536.8</td>
<td>0</td>
<td>0</td>
<td>46.5</td>
<td>0</td>
<td>0</td>
<td>9.7</td>
</tr>
<tr>
<td>Thailand Shrimp</td>
<td>11.3</td>
<td>97.4</td>
<td>630.5</td>
<td>1.8</td>
<td>4.1</td>
<td>9.2</td>
<td>3.2</td>
<td>3.3</td>
<td>11.4</td>
</tr>
<tr>
<td>Chile Fish/Fish Products</td>
<td>27.1</td>
<td>322.9</td>
<td>895.8</td>
<td>6.5</td>
<td>2.1</td>
<td>2.7</td>
<td>48.8</td>
<td>47.3</td>
<td>47.8</td>
</tr>
<tr>
<td>China Shrimp</td>
<td>0</td>
<td>180.2</td>
<td>846.3</td>
<td>0</td>
<td>7.5</td>
<td>12.4</td>
<td>0</td>
<td>3.9</td>
<td>11.8</td>
</tr>
<tr>
<td>Taiwan Pork</td>
<td>2.6</td>
<td>63.5</td>
<td>520.0</td>
<td>0.4</td>
<td>1.4</td>
<td>6.5</td>
<td>1.0</td>
<td>3.7</td>
<td>16.8</td>
</tr>
<tr>
<td>Fish Products</td>
<td>22.7</td>
<td>561.2</td>
<td>1310.3</td>
<td>5.4</td>
<td>3.7</td>
<td>4.0</td>
<td>8.5</td>
<td>32.9</td>
<td>43.4</td>
</tr>
<tr>
<td>Canned Veggies</td>
<td>85.7</td>
<td>443.1</td>
<td>397.7</td>
<td>13.5</td>
<td>9.3</td>
<td>12.7</td>
<td>32.3</td>
<td>26.0</td>
<td>13.2</td>
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<tr>
<td>Argentina Soybeans</td>
<td>0</td>
<td>604.5</td>
<td>549.6</td>
<td>0</td>
<td>10.9</td>
<td>11.5</td>
<td>0</td>
<td>11.6</td>
<td>10.1</td>
</tr>
<tr>
<td>Soybean Oil</td>
<td>0</td>
<td>53.4</td>
<td>415.5</td>
<td>0</td>
<td>4.6</td>
<td>23.4</td>
<td>0</td>
<td>1.0</td>
<td>7.6</td>
</tr>
<tr>
<td>Soybean Meal</td>
<td>0</td>
<td>68.4</td>
<td>117.9</td>
<td>0</td>
<td>2.0</td>
<td>17.6</td>
<td>0</td>
<td>1.3</td>
<td>2.2</td>
</tr>
<tr>
<td>Brazil Soybeans</td>
<td>27.1</td>
<td>393.9</td>
<td>989.7</td>
<td>2.3</td>
<td>7.1</td>
<td>16.5</td>
<td>1.6</td>
<td>4.2</td>
<td>7.4</td>
</tr>
<tr>
<td>Soybean Oil</td>
<td>0.8</td>
<td>421.3</td>
<td>333.9</td>
<td>0.2</td>
<td>36.2</td>
<td>18.7</td>
<td>0.1</td>
<td>4.5</td>
<td>3.0</td>
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<tr>
<td>Soybean Meal</td>
<td>43.6</td>
<td>1449.0</td>
<td>161.0</td>
<td>9.8</td>
<td>43.3</td>
<td>30.8</td>
<td>2.5</td>
<td>15.5</td>
<td>2.1</td>
</tr>
</tbody>
</table>

a 1967; b 1990; c 1978; d 1987
Sources: Case Study Sources; FAO Trade Yearbooks; UNCTAD International Trade and Development Statistics Yearbooks
Box 1: Soybeans Outperform Other Oilseeds and Cereals in Argentina

With very favorable agro-climatic conditions, Argentina has traditionally been a major producer and world supplier of grains. Inter-country comparisons show Argentina to be one of the lowest cost producers of cereals and selected oilseeds. The grain sub-sector, including oilseeds, has accounted for a large share of agricultural production and export earnings. For example, during the 1980s, this sub-sector contributed 37% of gross agricultural product and 47% of foreign exchange earnings. Between 1970 and 1988, the average annual growth in grain and oilseed production was 4.2%, a rate of growth well above that of the agricultural sector as a whole and the total national economy.

A large part (e.g. 2/3) of this growth in grain and oilseed production can be attributed to the emergence and rapid expansion of the soybean commodity system. In terms of productivity gains and exports, the performance of this commodity system has far outpaced that for major cereals and other oilseeds. Providing larger gross revenues and having a lower Domestic Resource Cost (DRC) ratio, soybeans have also been more profitable, both privately and socially, than other major cereals and oilseeds.

Comparative Performance Indicators of Major Crops

<table>
<thead>
<tr>
<th></th>
<th>Soybeans</th>
<th>Wheat</th>
<th>Maize</th>
<th>Sorghum</th>
<th>Sunflower</th>
</tr>
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<tbody>
<tr>
<td>Annual Growth Rates (1970-88)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Area Planted</td>
<td>30.6</td>
<td>1.7</td>
<td>-1.3</td>
<td>-1.9</td>
<td>3.5</td>
</tr>
<tr>
<td>Yields</td>
<td>3.3</td>
<td>2.0</td>
<td>2.6</td>
<td>2.5</td>
<td>4.8</td>
</tr>
<tr>
<td>Production</td>
<td>34.9</td>
<td>3.7</td>
<td>1.3</td>
<td>0.6</td>
<td>8.4</td>
</tr>
<tr>
<td>Gross Revenue (Constant Aust.)</td>
<td>-0.7</td>
<td>-0.7</td>
<td>-0.9</td>
<td>-1.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Gross Revenue/Hectare (Constat Aust.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974 - 1978 (Ave.)</td>
<td>14191</td>
<td>5308</td>
<td>15729</td>
<td>9271</td>
<td>12014</td>
</tr>
<tr>
<td>1984 - 1988 (Ave.)</td>
<td>22615</td>
<td>5599</td>
<td>12116</td>
<td>5915</td>
<td>11501</td>
</tr>
<tr>
<td>DRC (1984/85)</td>
<td>0.18</td>
<td>0.48</td>
<td>0.36</td>
<td>0.39</td>
<td>0.31</td>
</tr>
<tr>
<td>Export Volumes (Million Tons)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974 - 1978 (Ave.)</td>
<td>0.7</td>
<td>3.4</td>
<td>3.4</td>
<td>3.5</td>
<td>N.A.</td>
</tr>
<tr>
<td>1984 - 1988 (Ave.)</td>
<td>2.5</td>
<td>2.9</td>
<td>2.3</td>
<td>1.9</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

Source: World Bank Documents

Cost Advantages and Product/Service Differentiation

3.12 As noted earlier, the international competitiveness of a commodity system can stem either from a) lower costs of production and delivery or b) product differentiation. Table 9 below summarizes the major source(s) of competitive advantage in the focal cases and indicates where a shift in competitive strategy has taken place. Where the commodity system has had both a cost advantage and a differentiated product, an asterisk (*) indicates the most important factor in competitive success. The table also indicates cases in which international market penetration and trade expansion have been aided by 'off-season' or other complementary supply patterns.
### Table 9: Sources of Competitive Advantage for Commodity Systems

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico Tomatoes</td>
<td>Production*</td>
<td>Vine Ripe Tomatoes</td>
<td>Very Important</td>
<td></td>
</tr>
<tr>
<td>Kenya Vegetables</td>
<td>Production</td>
<td>Broad Product Range*</td>
<td>Historically Important</td>
<td>Although Less So Today</td>
</tr>
<tr>
<td>Chile Temperate Fruit</td>
<td>Production</td>
<td>Broad Range/Brand Name Tailor-made Products</td>
<td>Very Important</td>
<td></td>
</tr>
<tr>
<td>Israel Fresh Citrus</td>
<td>Production</td>
<td>Broad Range/Brand Name Tailor-made Products</td>
<td>Important</td>
<td>Shift from 'commodity' supplier to supplier of niche and technology-supported products</td>
</tr>
<tr>
<td>Chile Tomato Paste</td>
<td>Production</td>
<td>Bulk Transport and Tank Farm Distribution</td>
<td>Important</td>
<td></td>
</tr>
<tr>
<td>Brazil FCOJ</td>
<td>Production*</td>
<td>High-Quality Products*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina Beef</td>
<td>Production</td>
<td>High-Quality Products*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina Canned Meat</td>
<td>Production</td>
<td>High-Quality Products*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand Poultry</td>
<td>Production and Processing</td>
<td>Special Cuts of Meat*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile Fish/Products</td>
<td>Production</td>
<td></td>
<td></td>
<td>Initial shift from low-cost to differentiated supplier</td>
</tr>
<tr>
<td>Thailand Tuna</td>
<td>Processing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand Shrimp</td>
<td>Production</td>
<td>Range of Value-added Products*</td>
<td>Emerging shift from low-cost to differentiated supplier</td>
<td></td>
</tr>
<tr>
<td>China Shrimp</td>
<td>Production and Processing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taiwan (China) Food Processing</td>
<td>Tailor-Made and High-Quality Products</td>
<td>Completed Shift from low-cost to differentiated supplier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina Soybeans and Soybean Products</td>
<td>Production and Processing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil Soybeans and Soybean Products</td>
<td>Production*</td>
<td>Higher Oil Content (Bringing Premium Prices)</td>
<td>Important</td>
<td></td>
</tr>
</tbody>
</table>

3.13 The table indicates that the majority of these sub-sectors have incurred lower production costs than faced by many major competitors. Such lower production costs have been the result of different combinations of relatively low labor and land costs, availability of inexpensive inputs (e.g. feeds), government-built or subsidized infrastructure, and/or favorable yields (See Box 2).\(^5\) These production cost advantages have off-set the generally higher processing, packaging, and transport costs incurred in these subsectors. Few of the focal sub-sectors have achieved especially low processing costs, in part due to the common pattern of capacity underutilization in...
Relatively high (international) transport costs has lowered profitability within and/or the competitiveness of the Mexican tomato, Kenyan vegetable, Israeli citrus, and Brazilian soybean subsectors (See Box 2).

### Box 2: Favorable Yields Contribute to Competitiveness

Several of the focal commodity systems have achieved production yields and/or yield gains which exceed those achieved by major developing and industrialized country competitors. In the case of cultured shrimp production, China and Thailand have achieved yields and yield gains well above those of competing Asian countries. For soybeans, Argentina and Brazil have achieved average yields comparable to those of the United States (e.g. 2.16 tons/Ha.) and higher than those of other major developing country producers. For grapes, productivity gains by Chile over the past decade led it to match or surpass the average yields obtained by major Southern Hemisphere competitors.

<table>
<thead>
<tr>
<th>Cultured Shrimp Yields (Kgs./Hectare)</th>
<th>Soybean Yields (Tons/Hectare) (1985-90 Ave.)</th>
<th>Grape Yields (Tons/Hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China 578 1984</td>
<td>Argentina 2.06 1987</td>
<td>Chile 9.02 1979-81</td>
</tr>
<tr>
<td>Thailand 353</td>
<td>Brazil 1.76 600</td>
<td>S. Afr. 10.69 9.73</td>
</tr>
<tr>
<td>India 360</td>
<td>Paraguay 1.66 394</td>
<td>Argentina 9.69 9.47</td>
</tr>
<tr>
<td>Indonesia 142</td>
<td>China 1.39 209</td>
<td>World 7.00 6.97</td>
</tr>
</tbody>
</table>

(Aquatic Farms (1989) (USDA (1992)) (FAO Production Yearbook)

3.14 Several commodity systems, either initially or more recently, have sought to compete in international markets by differentiating their products or the marketing services accompanying these products. This has included efforts to provide especially high-quality products, products designed to meet special manufacturer requirements or consumer tastes, a broad range of related products, and special distribution services. In this regard, the Taiwanese food processing industry is especially interesting as it has successfully adapted to rising labor and raw material costs by improving product quality, developing new value-added products (e.g. shifting from primarily canned foods to frozen and prepared foods), and targeting its exports to higher price market segments. The Thai poultry and shrimp industries have followed a similar path in recent years. In the latter, many new value-added products have been developed to cater to Japanese demand. In several cases, lower labor costs have contributed to the achievement of higher quality or more preferred product forms, as with vine-ripened tomatoes from Mexico, 'extra-fine' Kenyan french beans, and Thai de-boned poultry products. In only one of the focal cases, that of Israeli fresh citrus fruit, has a national brand name been effectively used for product differentiation.57

56 There are exceptions, however, with processing costs being relatively low in the Thai poultry and tuna industries and in the Chinese shrimp sub-sector.

57 Canned tuna from Thailand is also in part distributed under a major brand name ("Bumble Bee") although this brand belonged to a U.S. firm until that firm was acquired by a Thai company in 1990.
The table below compares the costs of production, packing, and distribution of Mexican (Sinaloa) and Florida fresh tomatoes. Due to far lower labor costs and less intensive use of fertilizers, chemicals, and machinery, the per acre costs of pre-harvest production are less than half in Mexico than in Florida. A large part of this cost differential is countered by Florida's superior yields. Nevertheless, total pre-harvest costs per 25lb. carton are $2.75 for Mexico vs. $3.41 for Florida. In harvesting and post-harvest handling, grading, and packing, Mexico's cost advantage is extended further as a result of lower labor costs. Such cost advantages more than compensate for higher costs for containers and sales commissions. Most of Mexico's cost advantage for sales within the U.S. market is cancelled out by the combination of transport costs to the border, U.S. import duties, and other border fees. As a result of these added costs, Mexican tomatoes are cost competitive with those of Florida only in the western half of the United States. Most U.S. imports of Mexican tomatoes are marketed on the west coast and in the southwest.

Comparative Production and Distribution Costs Per Acre and Per 25 lb. Carton

<table>
<thead>
<tr>
<th></th>
<th>Sinaloa</th>
<th>Florida</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-Harvest Costs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeds</td>
<td>$145.71</td>
<td>$293.87</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>$177.46</td>
<td>$309.67</td>
</tr>
<tr>
<td>Agro-Chemicals</td>
<td>$214.28</td>
<td>$785.37</td>
</tr>
<tr>
<td>Labor</td>
<td>$373.14</td>
<td>$829.24</td>
</tr>
<tr>
<td>Machinery</td>
<td>$131.17</td>
<td>$812.62</td>
</tr>
<tr>
<td>Interest</td>
<td>$299.78</td>
<td>$165.87</td>
</tr>
<tr>
<td>Land Rent</td>
<td>$175.44</td>
<td>$298.44</td>
</tr>
<tr>
<td>Overhead/Misc.</td>
<td>$489.38</td>
<td>$1226.54</td>
</tr>
<tr>
<td><strong>Total Cost/Acre</strong></td>
<td>$2006.36</td>
<td>$4721.63</td>
</tr>
<tr>
<td>Average Yield (25 lb. Cartons)</td>
<td>729</td>
<td>1385</td>
</tr>
<tr>
<td><strong>Sub-Total Cost/Unit</strong></td>
<td>$2.75</td>
<td>$3.41</td>
</tr>
</tbody>
</table>

**Harvest/Pack/Sales Costs**

<table>
<thead>
<tr>
<th></th>
<th>Sinaloa</th>
<th>Florida</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvest/Haul</td>
<td>$0.36</td>
<td>$0.84</td>
</tr>
<tr>
<td>Grading/Packing</td>
<td>$0.28</td>
<td>$1.77</td>
</tr>
<tr>
<td>Containers</td>
<td>$0.88</td>
<td>$0.67</td>
</tr>
<tr>
<td>Selling + Miscellaneous</td>
<td>$0.91</td>
<td>$0.15</td>
</tr>
<tr>
<td><strong>Sub-Total Costs</strong></td>
<td>$2.43</td>
<td>$3.43</td>
</tr>
</tbody>
</table>

**Transport/Border Costs**

<table>
<thead>
<tr>
<th></th>
<th>Sinaloa</th>
<th>Florida</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight to Border</td>
<td>$0.67</td>
<td></td>
</tr>
<tr>
<td>U.S. Import Duty</td>
<td>$0.38</td>
<td></td>
</tr>
<tr>
<td>Crossing/Other Fees</td>
<td>$0.30</td>
<td></td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>$1.35</td>
<td></td>
</tr>
<tr>
<td><strong>Total Costs</strong></td>
<td>$6.53</td>
<td>$6.84</td>
</tr>
</tbody>
</table>

Additional Performance Indicators

3.15 Several other important dimensions of commodity system performance are examined in the individual case studies. One of these concerns the development of domestic markets and consumption. In several cases, the development of the sub-sector has supported per capita domestic consumption levels of meats and fruits and vegetables which are among the highest in the world (Box 4). This pertains to Argentine beef, Mexican tomatoes, Israeli citrus, and Taiwanese pork and fruits and vegetables. Sub-sector growth has also contributed to rapidly increasing consumption of shrimp and poultry in Thailand and of shrimp in China. Growth of the Brazilian soybean industry helped to counter the country's deficit in vegetable oils. In contrast, the expanding Chilean fish, Brazilian FCOJ, and Kenyan vegetable export operations have not contributed to a significant growth in local consumption or an improvement in the domestic marketing systems for these or similar products.

### Box 4: Big Eaters and Big Traders

Several of the focal commodity systems have supported very high domestic consumption of their products in addition to competing successfully in international markets. In at least three of our focal cases—Argentine beef, Israeli fresh citrus fruit, and Mexican fresh tomatoes—levels of domestic per capita consumption are the highest in the world. The following tables compare consumption levels for these countries and for other major consumers of the commodity(s).

<table>
<thead>
<tr>
<th>Per Capita Citrus Consumption (Kg./Year; 1989)</th>
<th>Per Capita Beef/ Veal Consumption (Kg./Year; 1980s)</th>
<th>Per Capita Tomato Consumption (Kg./Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel 40.8</td>
<td>Argentina 70 - 80</td>
<td>Mexico (1989) 14.1</td>
</tr>
<tr>
<td>Brazil 22.9</td>
<td>U.S.A. 40 - 45</td>
<td>USA (1990) 7.3</td>
</tr>
<tr>
<td>Japan 19.1</td>
<td>E.E.C. 15 - 25</td>
<td></td>
</tr>
<tr>
<td>U.S.A. 11.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAO Food Balances</td>
<td>USDA. World Livestock Situation</td>
<td>Cook et. al. (1991)</td>
</tr>
</tbody>
</table>

3.16 A second area of impact has been intra-industry multiplier effects. In Brazil, the expansion in soybean meal production was an important factor in the growth of the domestic livestock industry, especially for poultry. With an improved feed supply, Brazil’s poultry industry has emerged as one of the world’s largest exporters. Similar intra-industry stimuli are found in the cases of Israeli citrus, Chilean temperate fruits, and Thai fish and poultry. In the former two cases, the major expansion in fruit production contributed to the rapid growth of domestic fruit/vegetable processing industries which themselves have become internationally competitive. In Thailand, by-products of the tuna canning industry have been used as feed in poultry and cultured shrimp production.

3.17 Employment-generation has been another area of significant impact. In several cases, including Chilean fruit and fisheries, Brazilian FCOJ and soybeans, Argentine beef and soybeans, and the Taiwanese food processing industry, employment has been provided for more than 100,000 people in production, processing, and trading activities. Employment in the food processing industry of Taiwan (China) is estimated at 1.1 million.

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37

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38 It should be noted that in the Chilean fruit sub-sector farm-level employment is highly seasonal.
people. In several of the other cases, including Israeli citrus, Thai poultry, tuna, and shrimp, and Chinese shrimp production and processing, employment levels are significantly significant at between 25,000 and 75,000 people. As in the cases noted earlier, employment in many of these commodity systems has been geographically spread. In comparison, the employment effects have been much more limited and geographically concentrated in the cases of export-oriented Mexican tomato, Kenyan vegetable, and Chilean processed tomato subsectors due to the narrow ownership and participation base of the former case and the relatively small size of the latter two cases.

3.18 Although outside the scope of this paper and not examined in the case, another potentially significant set of issues concerns the impact of commodity system development on the value of land, on land markets, and on smallholder access to land. Evidence from Brazil, Mexico, and Chile suggests that the focal commodity export booms contributed to or accentuated patterns of land concentration and smallholder exclusion.

3.19 As discussed earlier, there are several sets of factors which are expected to contribute to the emergence and sustainability of internationally competitive food commodity systems, including (1) (international) market conditions and demand, (2) macroeconomic and sector policies, (3) natural resource and human capital endowments, (4) the development of physical, technical and social infrastructure, and (5) marketing efficiency and the coordination of production and marketing activities. These conditions, facilities, and institutions are discussed in turn.

International Market Environment

3.20 For most of the commodities covered by our case studies, world market conditions have been very favorable, either during the initial years when the focal industry experienced a rapid growth in trade or over a more extended period covering several decades. Favorable trends in world trade and in world prices for these commodities have been sparked not only by rising incomes, relatively high income-elasticities of demand, increased health consciousness, and demand for dietary diversity, but also by product and distribution system innovations which have both enhanced demand and increased value added.

3.21 In many of our focal cases, demand for the commodity (s) in industrialized countries was well-established long before the developing country 'success stories' entered international markets on a significant scale. Consumers were familiar with the products, while the physical and other infrastructure for imports and for market distribution were already well developed. The focal industries built upon this base, either enlarging the market in size or seasonality or replacing traditional domestic and/or international suppliers. The costs for market entry and development for these low/middle-income country sub-sectors were considerably lower than would have been the case if they were promoting consumption or use of a non-traditional or exotic commodity. While several of the focal sub-sectors did encounter protectionist moves by producers in foreign markets to limit imports, the focal sub-sectors were generally able to cultivate allies among the food manufacturers and/or distributors in such markets to stave off protectionist measures.

3.22 The generally favorable world market conditions are summarized in Tables 10 and 11 below. Table 10 compares the average growth rates in world imports for the case study commodities with those of more traditional tropical food and beverage products exported by many developing countries. The majority of our focal commodities featured world import growth of more than 4.0% per year over the 1970-88 period. Annual trade

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59 See Sanderson (1986) and Mares (1987) for Mexico, Soskin (1984) for Brazil, and Carter and Mesbah (N.D.) for Chile.

60 This applies to the cases of Mexican tomatoes, Brazilian FCOJ, Israeli fresh citrus, and Argentine beef.
growth has exceeded 7.5% for fresh vegetables, frozen concentrated orange juice, poultry, crustaceans (e.g. shrimp, crabs, lobster), and canned tuna over this period. Trade growth for fresh tomatoes and citrus fruits has been considerably slower since 1970, although there was rapid growth in trade during the 1950s and 1960s when the focal commodity systems experienced their initial or secondary trade booms. In comparison, the growth rate for world imports of many traditional beverage and tropical food crops has been generally in the range of only 1 - 3%.

<table>
<thead>
<tr>
<th>Case Study Commodities</th>
<th>%</th>
<th>Comparison Commodities</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Tomatoes</td>
<td>2.5</td>
<td>Bananas</td>
<td>1.2</td>
</tr>
<tr>
<td>Fresh Vegetables</td>
<td>7.6*</td>
<td>Coffee</td>
<td>1.4</td>
</tr>
<tr>
<td>Processed Tomato Products</td>
<td>6.0</td>
<td>Tea</td>
<td>2.1</td>
</tr>
<tr>
<td>Major Temperate Fruits</td>
<td>3.0</td>
<td>Cocoa</td>
<td>3.1</td>
</tr>
<tr>
<td>Fresh Citrus Fruit</td>
<td>1.4</td>
<td>Sugar</td>
<td>1.7</td>
</tr>
<tr>
<td>Frozen Conc. Orange Juice</td>
<td>11.6</td>
<td>Groundnut Oil</td>
<td>-1.5</td>
</tr>
<tr>
<td>Beef and Veal</td>
<td>4.0</td>
<td>Rice</td>
<td>2.9</td>
</tr>
<tr>
<td>Poultry (meat)</td>
<td>8.8</td>
<td>Copra Oil</td>
<td>0.9</td>
</tr>
<tr>
<td>Fresh Fish</td>
<td>5.4*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crustaceans (Shrimp, Crabs, etc.)</td>
<td>8.1*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canned Tuna</td>
<td>15.3*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole Soybeans</td>
<td>4.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soybean Meal</td>
<td>6.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soybean Oil</td>
<td>6.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 10: AVERAGE ANNUAL RATE OF CHANGE IN WORLD IMPORTS 1970 TO 1988

3.23 Table 11 provides indices of representative world prices for many of the case study commodities and for all major food commodities combined. With the exceptions of soybeans and soybean meal (whose nominal prices have been relatively flat since the late 1970s), each of the case study commodities has featured better long-term price trends than the aggregate food commodity category. World price trends for grapes, oranges, and FCOJ have been especially favorable.

3.24 While the case study subsectors have taken advantage of favorable long-term market trends, they have also benefited from shorter term market vacuums created when previous suppliers of the commodities (or of tradeable substitutes) suffered from adverse weather conditions, plant or animal disease, a reduction in productivity and/or restrictive trade measures imposed by governments. The rapidity and/or scale in which the focal commodity systems responded to these new market opportunities is what makes them especially distinctive. Examples of these market vacuums (and their beneficiaries) included:
a) the undersupply of the U.S. fresh tomato market in the early 1960s (and later) due to the trade embargo placed on Cuba and periodic frosts in Florida. This provided opportunities for Mexico and other Latin American countries to supply the 'off-season' winter market, yet it was Mexico which became the dominant player in this market.

b) the undersupply of the world and U.S. markets for frozen concentrated orange juice in 1977 and again in the early-to-mid-1980s due to damaging frosts in Florida. This provided market opportunities to existing or new FCOJ producers, yet Brazil would assume a dominant share of world trade within five to ten years of initial major investments in processing facilities.

c) the undersupply of the world market for livestock feeds during the early 1970s due to the rapid decline of the Peruvian anchovy catch and the short-term U.S. embargo on soybean exports. Brazil was among the first countries to respond to this market opportunity and Brazil and Argentina would eventually account for large shares of the growing international market.

d) the undersupply of the U.S. processed tomato market in the late 1980s following the imposition of a punitive tariff of 100% of canned tomato products from EEC countries. While several countries responded to this market opportunity (including Mexico, Israel, Turkey, and others), the growth in Chile's trade was the most sudden and substantial.

e) the undersupply of the U.S. and Japanese shrimp markets during the mid-to-late-1980s with the slowdown of production and trade from Latin America and with the collapse of the Taiwanese shrimp industry due to disease and pollution. This provided a stimulus for shrimp cultivation throughout Asia, although the Chinese and Thai industries have been the most successful.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>1972-74</th>
<th>1976-78</th>
<th>1982-84</th>
<th>1986-88</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Foods Commodities</td>
<td>100</td>
<td>151</td>
<td>147</td>
<td>135</td>
</tr>
<tr>
<td>Fresh Tomatoes</td>
<td>100</td>
<td>133</td>
<td>218</td>
<td>198</td>
</tr>
<tr>
<td>Tomato Paste</td>
<td>100</td>
<td>128</td>
<td>141</td>
<td>154</td>
</tr>
<tr>
<td>Table Grapes</td>
<td>100</td>
<td>158</td>
<td>201</td>
<td>259</td>
</tr>
<tr>
<td>Oranges</td>
<td>100</td>
<td>151</td>
<td>219</td>
<td>257</td>
</tr>
<tr>
<td>F.C. Orange Juice</td>
<td>100</td>
<td>147</td>
<td>243</td>
<td>237</td>
</tr>
<tr>
<td>Beef</td>
<td>100</td>
<td>103</td>
<td>140</td>
<td>138</td>
</tr>
<tr>
<td>Poultry</td>
<td>100</td>
<td>131</td>
<td>151</td>
<td>159</td>
</tr>
<tr>
<td>Shrimp</td>
<td>N.A.</td>
<td>100</td>
<td>142</td>
<td>154</td>
</tr>
<tr>
<td>Canned Tuna</td>
<td>N.A.</td>
<td>100</td>
<td>110</td>
<td>107</td>
</tr>
<tr>
<td>Soybeans</td>
<td>100</td>
<td>110</td>
<td>114</td>
<td>103</td>
</tr>
<tr>
<td>Soybean Meal</td>
<td>100</td>
<td>104</td>
<td>106</td>
<td>102</td>
</tr>
</tbody>
</table>

Table 11: Indices of World Prices For Case Study Commodities
(Based on Current Prices; Period Averages with 1972-74 = 100)

- **Weighted index of major beverages, cereals, and other foods (World Bank 1991).**
- **Unit values for U.S. imports (FAO Trade Yearbooks).**
- **Unit values for world imports (World Bank Economic and Social Data Base).**
- **Unit values for world imports (FAO Trade Yearbooks).**
- **EEC Indicative Import Price for Mediterranean Navel Oranges (World Bank 1991).**
- **Unit values (f.o.b) for Brazilian exports (Braga and Silber 1991).**
- **U.S. imported frozen boneless (World Bank 1991).**
- **Unit values for Japanese chicken meat import (World Bank 1991).**
- **Unit values for world imports (FAO Fisheries Commodity Statistics); 1976-78 =100**
- **U.S. exports c.i.f. Rotterdam (World Bank 1991).**
- **U.S. exports c.i.f. Rotterdam (World Bank 1991).**
3.25 It was not only a favorable international market environment which provided a boost to the development of the focal commodity subsectors. In the majority of cases, the development of a large domestic market for the fresh or processed product either preceded or paralleled the development of exports. Significant domestic market experience was obtained prior to exports in the cases of Kenyan vegetables, Thai poultry, Thai shrimp, and Taiwanese livestock and fruit and vegetable products, and paralleled export development in the cases of Mexican fresh tomato, Brazilian and Argentine soybeans, Argentine beef, and PRC shrimp. While the Mexican tomato, Argentine beef, and PRC shrimp sub-sectors were initially primarily export-oriented, one-half or more of production is now directed to the domestic market where per capita or total consumption levels are among the highest in the world.  

Local market development provided an arena for 'learning by doing' before entering international markets, enabled producers and marketing enterprises to spread their market risks, and facilitated fuller use of raw materials as some grades of produce or animal/fish parts could be directed to the local market while premium grades or choice parts could be channelled to export markets.

Macroeconomic Conditions, Human Capital, and Infrastructure

3.26 Table 12 summarizes selected macroeconomic patterns, human capital characteristics, and infrastructure features of the case study countries and for comparison, all low income, middle income, and OECD countries. Internationally competitive food commodity systems would be expected to emerge and be sustained in environments of high overall economic growth, low or moderate inflation, and high rates of growth in investment. Successful development of high-value food exports might also be expected to be associated with a healthy and literate/numerate work force (as represented here by the proxy indicators of life expectancy and adult literacy) and with a well-developed transport and communications network (as represented here by data for road densities and population per telephone). The indicators for Kenya and China should be compared with those of low-income countries, while those for the other case study countries should be compared with indicators for middle-income countries.

3.27 With regard to macroeconomic indicators, only three of the case study countries—China, Taiwan (China), and Thailand—stand out as particularly impressive over the entire 1965-89 period, although several other countries exhibited favorable growth and low-to-moderate inflation during the 1965-80 period when some of the focal commodity systems experienced sustained growth. With slow economic growth, limited aggregate investment, and high rates of inflation during the 1980s, it would not have been expected that Argentina, Brazil, Israel, and Mexico would be able to sustain formerly competitive food commodity systems.

3.28 In terms of GDP growth, China, Thailand, and Taiwan (China) each experienced considerably faster economic growth than their peer countries over the past quarter century. Brazil, Kenya and to a lesser extent Israel and Mexico had economic growth rates higher than the comparative norms during the 1965-80 period, but at or below these norms during the 1980s. Economic growth rates for Argentina and Chile have lagged behind those for other middle-income countries. Regarding inflation, the patterns are even more varied, with Argentina, Brazil, and Israel having relatively high inflation rates over the entire period, with Chile facing very high inflation during the 1960s and into the mid-1970s, with Mexico facing high inflation during the 1980s, and with the other case study countries experiencing low rates of inflation compared with all low- or middle-income countries. The patterns for gross domestic investment are also not especially impressive, with only Taiwan (China) and China (during both sub-periods), Thailand (in the 1980s), and Brazil (from 1965-80) having growth rates above their peer groups of countries. For five of the countries, gross domestic investment either declined or grew by less than 1% per year during the 1980s.

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61 Of the fifteen case studies, only five (e.g. Chilean temperate fruits and fish, Israeli fresh citrus, Brazilian FCOJ, and Thai tuna) have remained predominantly—that is, 80% or more—oriented toward exports.
Table 12: Macroeconomic Conditions, Human Capital, and Infrastructure in Case Study and Comparative Countries

<table>
<thead>
<tr>
<th>MACROECONOMIC CONDITIONS</th>
<th>Low Income</th>
<th>Middle Income</th>
<th>OECD</th>
<th>Argentina</th>
<th>Brazil</th>
<th>Chile</th>
<th>Israel</th>
<th>Kenya</th>
<th>Mexico</th>
<th>China</th>
<th>Taiwan (China)</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP 1965-1980 Avg. Annual Growth</td>
<td>4.8</td>
<td>6.2</td>
<td>3.8</td>
<td>3.4</td>
<td>9.0</td>
<td>1.9</td>
<td>6.8</td>
<td>6.8</td>
<td>6.5</td>
<td>6.9</td>
<td>9.9</td>
<td>7.3</td>
</tr>
<tr>
<td>GDP 1980-1989 Avg. Annual Growth</td>
<td>6.2</td>
<td>2.9</td>
<td>3.0</td>
<td>-0.3</td>
<td>3.0</td>
<td>2.7</td>
<td>3.2</td>
<td>4.1</td>
<td>0.7</td>
<td>9.7</td>
<td>7.8</td>
<td>7.0</td>
</tr>
<tr>
<td>Inflation 1965-1980 Avg. Annual</td>
<td>8.0</td>
<td>20.9</td>
<td>7.5</td>
<td>78.3</td>
<td>31.3</td>
<td>129.9</td>
<td>25.2</td>
<td>7.2</td>
<td>13</td>
<td>-0.4</td>
<td>10.4</td>
<td>6.2</td>
</tr>
<tr>
<td>Inflation 1980-1989 Avg. Annual</td>
<td>9.1</td>
<td>73</td>
<td>4.3</td>
<td>334.5</td>
<td>227.9</td>
<td>20.5</td>
<td>117.1</td>
<td>9.1</td>
<td>72.8</td>
<td>5.7</td>
<td>3.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Gross Domestic Investment 1965-1980 Avg. Annual Growth</td>
<td>7.5</td>
<td>8.5</td>
<td>3.6</td>
<td>4.6</td>
<td>11.3</td>
<td>0.5</td>
<td>5.9</td>
<td>7.2</td>
<td>8.5</td>
<td>10.7</td>
<td>13.8</td>
<td>8.0</td>
</tr>
<tr>
<td>Gross Domestic Investment 1980-89 Avg. Annual Growth</td>
<td>7.6</td>
<td>-0.3</td>
<td>4.3</td>
<td>-7.8</td>
<td>0.7</td>
<td>2.7</td>
<td>0.9</td>
<td>0.4</td>
<td>-5.0</td>
<td>13.7</td>
<td>5.9</td>
<td>5.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HUMAN CAPITAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Expectancy 1975</td>
</tr>
<tr>
<td>Life Expectancy 1989</td>
</tr>
<tr>
<td>Adult Literacy 1974</td>
</tr>
<tr>
<td>Adult Literacy 1985</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INFRASTRUCTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Density$^b$</td>
</tr>
<tr>
<td>Pop. per Telephone</td>
</tr>
</tbody>
</table>

a Data not available.
b Measured in length of roads in kilometers per square kilometer of area.

Sources: World Bank World Development Reports (1978, 1991) for macroeconomic and human capital data, except interest rates, which were obtained from the World Bank's Economic and Social Database; World Bank 1989 Social Indicators of Development for telephone and road data.
3.29 While this superficial review suggests that macroeconomic conditions are not determinant in the maintenance of an internationally competitive food commodity systems, this does not suggest that macroeconomic conditions are unimportant in inducing/deterring investments in food production and marketing and in the profitability of such investments. As is discussed in several of the case studies (including Mexican tomato, Chile fish and temperate fruits, Brazilian soybean and FCOJ, and China shrimp), the initial boom in production and trade accompanied or followed upon macroeconomic and trade policy changes which improved incentives. Such changes included exchange rate devaluations, reductions or reconfigurations of export taxes, the liberalization of imports for intermediate inputs, and other favorable policies. The case of Argentine soybeans is an exception in that its initial export boom (in the early-to-mid-1970s) occurred just as a new government was raising taxes on exported cereals and oilseeds, imposing a new value-added tax on domestic use of soybeans, and displacing the private grain trade with a monopoly government exporter.

3.30 While overvalued exchange rates, high rates of inflation, and generally high rates of effective taxation during the 1970s and 1980s did reduce the profitability of production, processing, and trade in several of the focal Latin American commodity system cases and contribute to the withdrawal or bankruptcy of individual firms therein, these subsectors were generally able to maintain their competitive position as a result of their low underlying cost structure, their large installed processing and marketing capacity, strong vertical and/or horizontal coordination by (or among) the remaining firms, and their well-developed overseas marketing linkages (Box 5). The same cannot be said for the Israeli fresh citrus trade, although the problems of competitiveness and profitability in this sub-sector extended beyond macroeconomic instability.62

3.31 Examining indicators of human capital, each of the case study countries has higher life expectancies and adult literacy rates than comparable categories of low- and middle-income countries. Argentina, Chile, Israel, and Taiwan (China) have levels of these indicators which approach those for OECD countries. With the single exception of Kenya, all of the other countries included in this study have a relatively large skilled and semi-skilled workforce with considerable managerial experience. Such human capital assets have undoubtedly been an important factor in the steady up-grading of product quality and marketing services which have occurred in a number of these sub-sectors and in the capacity to flexibly respond to changes in international demand and standards.

3.32 With regard to indicators of physical infrastructure, the case countries have road densities which are actually lower than the comparative norms, with the exceptions of Thailand, whose road endowment is similar to middle-income countries as a whole, and of Israel and Taiwan (China), both very small countries. While a less extensive road network is not a major problem for Chile, whose main agro-industries are located along the coastal plain, transport bottlenecks have been experienced in geographically large Argentina, Brazil and China. Indeed, high transport costs have reduced the returns to Argentine and Brazilian soybean producers. In sharp contrast, the telephone systems are generally far better developed in the case study countries than in comparable categories, the only exception being Thailand. Better communication links facilitate improved access to up-to-date market information, lower transaction costs, and generally improved trading relationships.

62 As discussed in the case study, Israel's competitiveness in the European citrus trade was also undermined during the 1980s by the growing mismatch of its product mix with emerging consumer preferences, increased shipping costs, conflicts of interest within the sector (which hindered a flexible response to changing requirements), and an expansion and improvement in quality in competing Spanish citrus production.
Box 5: Discrimination of Agriculture in the Focal Latin American Countries

In each of the focal Latin American countries, agriculture has been taxed and otherwise discriminated against in national development programs emphasizing industrial development. Agriculture has been taxed both directly and indirectly, the latter through duties applied to imported agricultural inputs and through measures which have protected domestic producers of industrial goods (including intermediate inputs for agriculture such as machinery, packaging materials, etc.). Agriculture has also been penalized by over-valued currencies which have depressed the price of tradables relative to non-tradables. As the data below on effective rates of protection indicate, the negative effects of these policies have not been counterbalanced by the selective subsidy programs provided for credit, water, tractors, etc.

Effective Rates of Protection

<table>
<thead>
<tr>
<th></th>
<th>Chile Grapes</th>
<th>Argentine Beef</th>
<th>Argentine Soybean</th>
<th>Brazilian Soybean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-1964</td>
<td>-0.37</td>
<td>-0.46</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>1965-1969</td>
<td>-0.05</td>
<td>-0.48</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>1970-1974</td>
<td>+0.47</td>
<td>-0.28</td>
<td>N.A.</td>
<td>-0.26</td>
</tr>
<tr>
<td>1975-1979</td>
<td>+0.47</td>
<td>-0.25</td>
<td>-0.33</td>
<td>-0.40</td>
</tr>
<tr>
<td>1980-1984</td>
<td>-0.10</td>
<td>-0.50</td>
<td>-0.50</td>
<td>-0.36</td>
</tr>
</tbody>
</table>

Sources: Hurtado, Valdes, and Muchnik (1990); Sturzenegger (1990); Brandao and Carvalho (1990)

The table indicates that while Chilean grape production was effectively taxed during the 1960s, it was provided positive protection during the 1970s, the years of its initial export boom. Argentine beef has faced substantial negative protection over the period examined. While both Argentine and Brazilian soybean have faced negative protection, similar (or higher) levels of direct and indirect taxation has been applied in these countries to other oilseeds and cereals, rendering world price levels and trends an important determinant of the relative profitability of different crops.

Government Support and Interventions

3.33 Government interventions in the case study commodity systems have generally been quite extensive, although their forms and longevity have differed considerably. This can be seen in Table 13 below. Direct government participation in production and marketing has been substantial or dominant only in two cases. In China, it was state enterprises which initiated shrimp aquaculture through investments in production infrastructure and research. State trading enterprises in China have also undertaken the export marketing of frozen shrimp. In Israel, a government-created marketing board exercised monopoly buying and export rights for fresh citrus fruit over the period from 1948 to 1990 when this monopoly was lifted.63 In several of the other focal commodity systems, direct trading activities by state enterprises have also occurred, although this

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63 Israel's citrus processing industry has long been dominated by private and cooperative enterprises, although until recently these firms were required to procure their raw materials from agents of the Citrus Marketing Board.
has generally been on a modest scale, involving product stockholding and regional trade in domestic markets
and/or ad hoc deals with state importing agencies in the Middle East and the former Soviet Union. Such state
enterprise trading has taken place in the Kenyan horticulture, Argentine beef and soybean, Thailand shrimp,
and Brazil soybean commodity systems.

3.34 Direct government investments in production and/or marketing infrastructure have occurred in nearly
all of the focal cases. In most instances, this investment consisted of ports, market places, auctions, and
storage and transport facilities which either exhibit 'public good' characteristics or have entailed large up-front
investments and significant economies of scale. Only in the cases of Chilean fruit and PRC shrimp have
governments invested directly in food processing plants. In the Chilean case, this investment has been of a
short-term or transitional nature as factory ownership has typically transferred from the government-supported
Fundacion Chile to private investors after only a few years of operation. Hence, with the exceptions of
Chinese shrimp and Israeli fresh citrus, commercial production and trade in the focal commodity systems has
been dominated by the private sector (including cooperatives).

3.35 Governments have provided a variety of different support services in each of the focal cases, although
the available information enables us to make only tentative comments about the actual significance of such
support services for export development. In virtually all cases, governmental institutes and/or public
universities undertook production, post-harvest, and/or food technology research which contributed to
production and trade expansion and quality gains. Government research and extension were especially critical
in the development of shrimp aquaculture in China and Thailand, in the expansion of pig production in Taiwan
(China), in the upgrading of quality in Thai poultry, and in the recent adoption of new citrus and temperate
fruit varieties in Israel and Chile respectively. A pattern common to many of the focal cases is that once
commercialization reached relatively advanced stages, much of the applied research work has been undertaken
by the leading private or cooperative firms or other non-governmental bodies (e.g. foundations, associations).

3.36 Government involvement in the collection and dissemination of market information has been less
common and less important among the focal commodity systems than might be expected given the public
goods nature of market information. Most such efforts have involved the provision of statistics and the
distribution of newsletters. Important exceptions are the more extensive fresh product market information
system developed in Taiwan by the government (in collaboration with cooperatives) and the livestock/meat
market price system developed in Argentina by the National Meat Board. In a majority of cases, governments
have promoted exports, primarily through trade fairs and bilateral or multilateral market access negotiations.
The government-supported Fundacion Chile and the Israel Citrus Marketing Board have conducted direct
advertising campaigns both in domestic and external markets.

3.37 In virtually all of the focal commodity systems, governments have played some role in product quality
control, whether simply through communicating international quality standards to producers/processors,
through undertaking sample quality inspections on exported or domestically-sold products, or through the
inspection (and licensing) of factories, cold storage units, and other processing and marketing infrastructure.

3.38 In a majority of cases, governments have taken an activist microeconomic position, providing subsidies
in one or more forms to producers, processors, and/or traders, although as noted in Box 5, these subsidies
have not fully countered the negative incentive effects of overvalued exchange rates, industrial protection,
and direct commodity taxation in several Latin American countries. In such cases as Chilean fruit, Israeli citrus,
Brazilian FCOJ and soybean, and Chinese Shrimp, subsidies have been provided both for raw material
production and for the subsequent processing and marketing operations. The most common forms of subsidy
have been low interest production credits, subsidies on production infrastructure and material inputs, and
grants and low interest loans for investments in processing and storage facilities. In a number of cases,
subsidies were removed or substantially reduced once the sub-sector reached a mature status; in others, subsidies remained for many years, partly to compensate for the adverse effects of macroeconomic or other sectoral policies.

3.39 It is important to note that in the large majority of cases, production and investment subsidies were not targeted on the specific commodities covered in this study. For the most part, subsidies for water, energy, fertilizer, tractors, irrigation facilities, crop storage facilities, and processing facilities were available to producers, processors, and traders of other commodities as well. Commodity-specific production and investment subsidy programs were implemented only in the cases of Israeli citrus, Chinese shrimp, Brazil and Argentina soybean processing, and various Taiwanese sub-sectors. In the cases of Chilean fruit, Brazilian FCOJ, and Chinese shrimp, producers, processors, and traders also benefitted (over several years) from income, value-added, and/or export tax exemptions. Differential tax rates on exports of fresh and processed goods was an important factor inducing investment in soybean processing in both Brazil and Argentina.

3.40 In approximately half of the cases, governments have (either on a continuous or intermittent basis) intervened to control or adjust commodity prices and/or traded volumes. This has been done through such measures as official producer support prices, minimum export prices, direct controls on domestic prices, and production, processing, and export quotas. In such cases as Mexican tomatoes, Israeli citrus, and Brazilian FCOJ, these interventions have been at least partly driven by the objective of maximizing export revenues through the control of international supplies. In most other cases, these interventions were designed either to protect domestic consumers or to counter capital flight.
<table>
<thead>
<tr>
<th>Commodity System</th>
<th>RD&amp;E</th>
<th>Market Information</th>
<th>Export Promotion</th>
<th>Quality Control</th>
<th>Price/Quantity Controls</th>
<th>Subsidies</th>
<th>Taxation Distinctions</th>
<th>Direct Investment</th>
<th>Direct Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico Tomatoes</td>
<td>Joint Public/Private Research</td>
<td>ITC Market News Service</td>
<td>Minor</td>
<td>Product Inspection</td>
<td>Minimum Export Prices; Freight Rate Controls</td>
<td>Irrigation Facilities; Water; Fertilizers; Energy</td>
<td>Collection Stations</td>
<td>Cold Storage at airport</td>
<td>Minor</td>
</tr>
<tr>
<td>Chile Fruit</td>
<td>Varietal Devel. Cultivation Methods Pest Control Extension</td>
<td>Advertising/Promotion Market Access Neg.</td>
<td>Price Pooling Packer Quotas</td>
<td>Fruit Supply to Industry</td>
<td>Water; Irrigation Dev.; Energy; Packing House Construction; Exchange Rate Compensation</td>
<td>Cold Storage Post/Transport Facilities</td>
<td>Cold Storage</td>
<td>Trade Offices</td>
<td>Exclusive from 1948 to 1991</td>
</tr>
<tr>
<td>Brazil FCOJ</td>
<td>Varietal Devel. Pest Control</td>
<td>Domestic and International Market Access Neg.</td>
<td>Minimum Export Prices; Controls on Input Prices; Export Quotas</td>
<td>Processing equipment; Production credit/input Exporter financing</td>
<td>Income + V.A. tax exempt; Off/on for exports</td>
<td>Rail/Port facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina Beef</td>
<td>Animal health, Nutrition, and Disease Domestic and International Price Information</td>
<td>Gov't-Gov't deals Market Access Neg.</td>
<td>Meat Grading Factory Inspection</td>
<td>Domestic price controls; minimum export prices; export licensing/quotas</td>
<td>Processing facilities; Debt financing</td>
<td>Variable levy</td>
<td>Transport and market facilities</td>
<td>Some in the past</td>
<td></td>
</tr>
<tr>
<td>Thailand Poultry</td>
<td>Breeding, Nutrition, and Disease Daily Trade Journal</td>
<td>Gov't-Gov't Market Access Neg.</td>
<td>Factory Inspection</td>
<td>For genetic upgrading and slaughterhouse exports</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile Fish</td>
<td>Food Technology; Training</td>
<td>Statistics; Market laws</td>
<td>Minor</td>
<td>Sanitation Certification</td>
<td></td>
<td></td>
<td></td>
<td>Fish ponds</td>
<td></td>
</tr>
<tr>
<td>Thailand Tuna</td>
<td>Research and Extension</td>
<td>Gov't-Gov't Market Access Neg.</td>
<td>Factory Inspection</td>
<td>(Initially for) Processing facilities</td>
<td></td>
<td></td>
<td></td>
<td>Fishery ports; Cold storage; auctions</td>
<td></td>
</tr>
<tr>
<td>Thailand Shrimp</td>
<td>Research and Extension</td>
<td>Gov't-Gov't Market Access Neg.</td>
<td>Factory Inspection</td>
<td>(Initially for) Processing facilities</td>
<td></td>
<td></td>
<td></td>
<td>Cold storage; Stabilization stocks</td>
<td></td>
</tr>
<tr>
<td>China Shrimp</td>
<td>Nutrition, Disease, and Management Research and Extension</td>
<td>Newsletters</td>
<td>Trade Fairs</td>
<td>Factory Inspection</td>
<td>Production Quotas</td>
<td>Grants and Low Interest loans for pond construction, production start-up, and processing facilities</td>
<td>Income tax exempt</td>
<td>Ponds, hatcheries; Storage and processing facilities</td>
<td>Dominance</td>
</tr>
<tr>
<td>Taiwan (China) High-Value Food Processing</td>
<td>Food Technology Vegetable/Animal Aquaculture Research + Extension</td>
<td>Urban Market Information System</td>
<td>Trade Fairs</td>
<td>Factory Inspection</td>
<td>Support Prices for Pig and Vegetable Producers</td>
<td>Machinery for Processing Cooperative Milk; Infras Fuel for Fishing Boats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil Soybean</td>
<td>Research</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina Soybean</td>
<td>Research and Extension</td>
<td>Gov't-Gov't Market Access Neg.</td>
<td>Product Inspection</td>
<td>Producer support price</td>
<td>Tractors; Production credit; Consumer subsidies</td>
<td>Differential tax for fresh beans and processed products</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 13: Government Involvement in Case Study Commodity Systems
Commodity System Organization and Coordination

3.41 This section provides a synthesis of major institutional/organizational patterns in the case study commodity systems. We examine the competitive structure within these systems, the primary institutional linkages between producers and processor/exporters and between the latter and foreign market buyers/agents, and the roles played by foreign private companies and by local producer or trade associations.

Competitive Structure

3.42 Table 14 summarizes the competitive structure of production, processing/packing, and domestic distribution and exporting in the case study subsectors. Production or trade is denoted as 'Highly Decentralized' if it features numerous firms or individuals, with the largest ten accounting for less than 50% of supplies, processing capacity, or sales. An operation is labelled an 'Oligopoly' if the ten largest firms or individuals account for more than 50% of the market. A label of 'Concentrated Oligopoly' is given to operations in which five or fewer firms control 75% or more of the market. The label 'Monopoly' refers to an exclusive processor or trader. The indicated structures are those which prevailed during the mid-to-late-1980s. It is recognized that a concentrated structure is not a sufficient condition to suspect the presence of collusive and anti-competitive practices.

3.43 The table shows that while production and domestic marketing are generally highly decentralized, most cases feature relatively high levels of concentration at the packing or processing stage and most especially in export marketing. This pattern is not unexpected given the economies of scale in processing and export logistics and sales and the high transaction costs associated with international trade.

3.44 Virtually all of the subsectors have developed with the participation of large numbers of crop, fish, or animal product producers. In some cases, including Kenyan vegetables, Israeli citrus, Thai poultry, Thai and China shrimp, and Taiwanese vegetable and pork sub-sectors, farm producers number in the thousands and generate operate on a small-to-medium scale. Still, technological changes, economic pressures, and vertical integration by input suppliers or downstream marketing enterprises into production have contributed to increased concentration in production over time in some of these sub-sectors. Export-oriented fruit production in Chile and soybean production in Brazil and Argentina has been undertaken by relatively large numbers of middle- and especially large-scale farmers and agribusinesses. Only one of the focal cases has featured a very narrow production base. Export-oriented fresh tomato production in Mexico has remained the preserve of about a dozen local companies, due to preferential access to water resources, government-delegated powers to regulate (export-oriented) tomato plantings and sales, and favorable ties to U.S. vegetable distributors. The Thai tuna canning industry is unique among our cases in that it relies upon imported fish for 70% of its raw material requirements.

3.45 Domestic marketing of the focal commodities remains highly competitive in most of the focal subsectors, even where export marketing has become concentrated among a few firms. Domestic marketing systems have often featured the wide participation of cooperatives, brokers, and small-to-medium scale private firms, in addition to a handful of larger wholesaler/distributors. In a number of

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64 Large numbers of Mexican farmers do produce tomatoes for household consumption and domestic sales.
cases (including Argentine beef and soybeans, Mexican tomatoes, and Thai shrimp), large auctions or terminal markets have enhanced the competitive environment of local markets. Direct marketing between producers and either retail chains or restaurants/hotels has also emerged in a number of these cases.65

Table 14: COMPETITIVE STRUCTURE OF COMMODITY SYSTEMS

<table>
<thead>
<tr>
<th>Commodity System</th>
<th>Highly Decentralized</th>
<th>Oligopoly</th>
<th>Concentrated Oligopoly</th>
<th>Monopoly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico Fresh Tomatoes</td>
<td>Local Sales</td>
<td>Production Packing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exporting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kenya Fresh Vegetables</td>
<td>Production</td>
<td>Packing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exporting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile Temperate Fruits</td>
<td>Production</td>
<td>Packing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exporting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Israel Citrus</td>
<td>Production</td>
<td>Processing</td>
<td>Packing</td>
<td>Export</td>
</tr>
<tr>
<td>Chile Processed Tomatoes</td>
<td>Production</td>
<td>Processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exporting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil FCOJ</td>
<td>Production</td>
<td>Processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exporting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand Poultry</td>
<td>Production</td>
<td>Processing Local Sales</td>
<td></td>
<td>Exporting</td>
</tr>
<tr>
<td>Argentina Beef</td>
<td>Production Local Sales</td>
<td>Processing Local Sales</td>
<td></td>
<td>Exporting</td>
</tr>
<tr>
<td>Chile Fish</td>
<td>Production Processing/Exporting Fish</td>
<td>Processing/Exporting Fish Oil/Meal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand Tuna</td>
<td>Production (Imported)</td>
<td></td>
<td>Processing Exporting</td>
<td></td>
</tr>
<tr>
<td>Thailand Cultured Shrimp</td>
<td>Production Processing Local Sales Exporting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China Cultured Shrimp</td>
<td>Production Local Sales</td>
<td></td>
<td>Processing Exporting</td>
<td></td>
</tr>
<tr>
<td>Taiwan (China) Vegetable, Pork, and Fish Processing</td>
<td>Production Processing Local Sales Exporting</td>
<td></td>
<td>Exporting</td>
<td></td>
</tr>
<tr>
<td>Brazil Soybeans</td>
<td>Production Processing Local Sales Exporting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina Soybeans</td>
<td>Production Local Sales</td>
<td></td>
<td>Processing Exporting</td>
<td></td>
</tr>
</tbody>
</table>

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65 Examples include: Mexican tomatoes, Kenyan vegetables, Israeli citrus, Thai poultry and shrimp, and Argentine beef.
While there are a few exceptions, fresh produce packing, processing, and exporting have tended toward oligopolistic structures with between three and ten firms accounting for the bulk of operating capacity and sales. In one-third of our cases (e.g. Israeli citrus, Brazilian FCOJ, Thai poultry and tuna, and Chinese shrimp), three firms or less have recently accounted for 75% or more of total exports. In such cases as Kenyan vegetables, Chilean temperate fruit, and Thai tuna and poultry, concentrated trade structures have resulted largely from economic factors, with a limited number of firms taking advantage of superior technical or financial resources and overseas market linkages to acquire leadership positions within their industries. Having invested in modern packing and/or processing facilities and having effectively penetrated overseas markets, such firms have been better able to adapt to changing market requirements.

In several other cases, the concentration of trade has derived from government interventions as much as from economies of scale or other underlying economic factors. For example:

-- In Mexico, the government has given the National Commission of Vegetable Producers and individual state producer unions the power to control planted acreage, export licenses, and export volumes so to exercise market power in the United States and maintain the profitability of the Mexican industry. Powerful members in these producer unions have been able to control entry into export-oriented tomato production and to consolidate their own positions.

-- In Israel, several laws and regulations adopted in the 1940s created a marketing cartel in the form of the Citrus Marketing Board which incorporated many of the larger pre-WWII exporters as contractors to the Board and as members, together with government representatives, of the Board’s decision-making committees. By operating as the sole buyer and seller of Israeli fresh citrus, the CMBI was designed to achieve economies of scale in the procurement of inputs and in export logistics and to assert Israel’s market power in Europe for selected fruits during certain months. This cartel faced serious difficulties as its members had widely differing interests with regards to the quality and types of fruits to market, the timing of sales, and the patterns of grower remuneration from a price pool.

-- In China, initially an export monopoly for shrimp was given to the National Cereals, Oils, and Foodstuffs Import and Export Corporation and later (in 1985) shrimp and other food export rights were granted to provincial foreign trade corporations (all state enterprises).

-- In Brazil, government credit programs and the periodic imposition of export quotas (based on past exports) contributed to the consolidation of a three-firm dominance of the FCOJ industry with some degree of price coordination in international markets.

Institutional Arrangements Linking Producers with Processors/Exporters

In the focal commodity systems, various institutional arrangements have been developed to coordinate raw material production with processing and other downstream requirements. These patterns are summarized in Table 15, which represents a 'snapshot' of important institutional arrangements prevailing in the late 1980s. The Table indicates that while in the majority of cases there are open market linkages between some producers and processors/exporters, only in two cases is arms-length trade the dominant mode of raw material procurement. In the case of Argentine beef, a well-established system of auctions, terminal markets, and brokerage arrangements (dating back more than 50 years) facilitates a steady and massive movement of cattle from producers to slaughterhouses and processors. In the case of Thai tuna, Bangkok's fish markets have become amongst the largest and well-developed in Southeast Asia.
Asia, providing Thai canners with a steady and large supply of different tuna species caught both in the Indian and Pacific Oceans. In all other cases, market coordination has been supplemented or replaced by a combination of other modes of vertical coordination, including seasonal (or longer term) contracts, ownership integration, cooperative coordination, and/or government coordination.

<table>
<thead>
<tr>
<th>Commodity System</th>
<th>Market Coordination</th>
<th>Contract Coordination</th>
<th>Ownership Integration</th>
<th>Cooperative/Association Coordination</th>
<th>Gov’t Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico Tomatoes</td>
<td>X</td>
<td>X</td>
<td>XX</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Kenya Fresh Vegetable</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile Temperate Fruit</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Israel Fresh Citrus</td>
<td>XX</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Chile Processed Tomatoes</td>
<td>X</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil FCOJ</td>
<td></td>
<td>XX</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand Poultry</td>
<td>X</td>
<td>XX</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Argentina Beef</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile Fish</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>(Meal/Oil)</td>
<td>X</td>
</tr>
<tr>
<td>Thailand Tuna</td>
<td>XX</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand Cultured Shrimp</td>
<td></td>
<td>XX</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China Cultured Shrimp</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taiwan (China) Pork</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td>X</td>
<td>XX</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Brazil Soybean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Argentina Soybean</td>
<td>X</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

XX denotes the dominant linkage in the industry

3.49 Contractual coordination is important in all of the case studies involving fresh and processed fruit and vegetables as well as in the Thai poultry and shrimp sub-sectors. While the actual contractual arrangements vary, most feature the supply of credit and/or production inputs, a forward or formula pricing mechanism, and specifications regarding the quantity, quality, and timing of producer deliveries. Such arrangements have improved the flow of information, technologies, money, and

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66 For detailed discussions on particular contract farming schemes within Kenyan horticulture and Thai poultry, see Jaffee (1988) and Manarungsan et al. (1989) respectively.
physical commodities between producers and processor/exporters and facilitated a sharing of production
and/or market risks.

3.50 Many of the subsectors feature at least some vertical integration between production and
downstream activities. This has normally been undertaken by relatively large processing/trading firms in
order to reduce raw material supply risks and costs or by larger farmers seeking to capture a larger share
of the export revenues. In both the Thai poultry and shrimp cases, individual firms have developed
operations integrating feed supply, production, processing, and trade. In many cases, processors have
combined own production with contracted outgrower supplies so to achieve a preferred mix of cost
economizing and risk spreading. In general, the export-oriented components of individual sub-sectors have
exhibited far more intensive vertical coordination than production and trade for domestic markets.
However, in many cases the contractual and other coordinating methods used by exporters are being
increasingly adopted in the domestic market, especially by producers and firms targeting higher-quality,
higher-price market segments.

3.51 Cooperatives or producer and trade associations have played an important marketing and
coordination role in several of the case study commodity systems. In the Mexican case, both the National
Union of Vegetable Producers and the Confederation of Agricultural Associations of the State of Sinaloa
have played important coordinating roles, not only through their assignment of acreage and export quotas,
but also in their dissemination of market information, their assistance in agricultural inputs procurement,
their enforcement of tomato quality standards, and their liaisons with government water authorities. In
Taiwan (China), cooperatives have played a very important role in the domestic marketing of smallholder
fruit, vegetable, and pork production and in the exports of fresh fruit and vegetables. The same holds true
in the Argentine and Brazilian soybean sub-sectors. Producer and trader associations have been active in
establishing quality standards, negotiating producer prices, and settling disputes in the cases of Chilean
fruit and fish and Thai shrimp.

3.52 In several cases, government trading or regulatory agencies have played a role in coordinating
production and downstream operations. The pattern for Mexican tomato exports has already been
discussed. In Israel, the Citrus Marketing Board gave annual supply quotas (specifying quantities,
varieties, and delivery times) to a limited number of private or cooperative packing/production companies
which in turn had annual supply agreements with many individual farmers. In Brazil, the government
periodically intervened in negotiations and disputes between growers and processors, seeking to work out
appropriate methods for allocating market risks and determining producer prices. In the case of Thai tuna
processing, the Thai government has coordinated government controlled fresh tuna supplies from the
Maldive Islands.

Institutional Arrangements Linking Exporters With Foreign Markets

3.53 Table 16 summarizes the institutional linkages (during the mid-to-late 1980s) between exporters
in the focal subsectors and foreign market buyers or agents.67 Once again, the table indicates that while
open market sales occur in each case, such sales constitute the dominant linkage to foreign markets in
only three of the commodity systems. Spot market sales or sales on consignment are very important in
the exports of Chilean temperate fruits, Israeli citrus, Argentine beef, Brazilian and Argentine soybeans,
and PRC shrimp. In all but the last of these cases, shipments are made over very long distances to well-
developed markets, featuring major wholesale outlets or mercantile commodity exchanges. Until recently,

67 The cases for Chilean fish and processed tomato products and Taiwan food processing are not included
since the available materials provided insufficient information on export sales arrangements.
The bulk of Chinese shrimp exports have been undertaken either at periodic trade fairs in the country or via Hong Kong commercial agents.

<table>
<thead>
<tr>
<th>Commodity System</th>
<th>Market Coordination</th>
<th>Contract Coordination</th>
<th>Ownership Integration</th>
<th>Government Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico Tomatoes</td>
<td>X</td>
<td>X</td>
<td>XX</td>
<td></td>
</tr>
<tr>
<td>Kenya Fresh Vegetable</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile Temperate Fruit</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Israel Fresh Citrus</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil FCOJ</td>
<td>X</td>
<td>XX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand Poultry</td>
<td></td>
<td>X</td>
<td>XX</td>
<td></td>
</tr>
<tr>
<td>Argentina Beef</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Thailand Tuna</td>
<td>X</td>
<td>X</td>
<td>XX</td>
<td></td>
</tr>
<tr>
<td>Thailand Cultured Shrimp</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>China Cultured Shrimp</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Brazil Soybean</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Argentina Soybean</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

XX denotes the dominant linkage in the industry

3.54 At least a portion of trade in nearly all the cases occurs in the context of seasonal, annual, or other contracts. Some 80% of Brazil’s FCOJ exports to the U.S. are conducted within the framework of long-term contracts with multinational beverage manufacturers/distributors. While most of the subsectors feature some trade conducted on an intra-firm basis by local or multinational companies, such intra-firm trade is dominant in the cases of Mexican tomatoes and Thai poultry and tuna. Approximately 60% of the vegetable distributors based in Nogales, Arizona (the U.S. entry point for most Mexican winter vegetables) are partners with Mexican producing/packing companies, while 20% of these distributors are owned outright by Mexican firms. Three Japanese companies handle virtually all of Thailand’s exports of frozen chicken parts to Japan. Thailand’s leading tuna canners have integrated forward into major markets, buying up leading import/distribution firms. Approximately 25% of Kenya’s fresh vegetable (and fruit) exports are conducted with overseas firms which are affiliated through familial ties with Kenyan exporters.

3.55 These long-term contractual ties or ownership linkages have been important in maintaining market access, in penetrating rapidly expanding marketing channels (e.g. for retail chains), in obtaining detailed and up-to-date information on market conditions and consumer tastes, in reducing uncertainties regarding payments, and in assuring continuity of supplies so to benefit from (national or foreign) brand name promotion. In circumstances where product demand and/or distribution channels needed to be built up from an only rudimentary base, such personalized trade or ownership linkages provided an effective framework (See Box 6). In several cases, including Mexico tomatoes, Chile fruit, Brazil FCOJ, Argentina beef, Thai poultry, and Brazil soybean, long-term foreign trading partners have actively campaigned for continued supplier access to industrialized country markets in the face of pressures by domestic producers for protection against imports.
search our new distribution channels, including those serving multiple-chip manufacturers.

To expand our sales and distribution networks and provide services for our customers, we have established our own distribution channels.

Our new distribution channels include a network of regional sales representatives and a direct sales force.

These representatives are based in key markets throughout the United States and Canada.

By the late 1970s, our sales force had grown significantly, and we were able to provide our customers with a faster, more responsive service.

Our distribution channels are well-established and have been proven to be effective.

In 1979, we introduced a new product line that quickly became a market leader.

We are continuing to expand our distribution channels and look forward to continuing to serve our customers.
As indicated earlier, in several of the cases, governments have either directly negotiated deals with foreign government importing agencies or have negotiated access and entry terms for private exporters into foreign markets. Those signified in the table relate only to direct trade deals.

**Foreign Capital and Technology in the Case Study Subsectors**

Foreign capital, technology, training, and management skills have played an important role in the development of many of the focal commodity systems, especially during their initial 'take-off' stages. The primary roles of foreign companies or international donor agencies is summarized in Table 17.

<table>
<thead>
<tr>
<th>Commodity System</th>
<th>Production/ Direct Supply of Material Inputs</th>
<th>Financing/Direct Investment in Production</th>
<th>Direct Investment in Processing/Marketing Facilities</th>
<th>Other Capital or Technology Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico Tomatoes</td>
<td>Seeds, Agro-chemicals</td>
<td>Major Financing of Production</td>
<td>Yes; Plus Financing of Packing Operations</td>
<td>Private Training</td>
</tr>
<tr>
<td>Kenya Vegetables</td>
<td>Seeds</td>
<td>Minor Direct Investment</td>
<td>Minor</td>
<td>Private Training</td>
</tr>
<tr>
<td>Chile Fruits</td>
<td>Seedlings</td>
<td>Direct Investment</td>
<td>Direct Investment</td>
<td>University Training and Technology Exchange; Donor Financing</td>
</tr>
<tr>
<td>Israel Citrus</td>
<td>Seedlings</td>
<td>Some Direct Investment</td>
<td></td>
<td>Donor Financing for Irrigation and Orchard Rehabilitation</td>
</tr>
<tr>
<td>Chile Processed Tomatoes</td>
<td>Seeds</td>
<td>Direct Investment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil FCOJ</td>
<td>Processing Equipment</td>
<td>Direct Investment</td>
<td>Major Direct Investment</td>
<td>University Training and Exchanges Donor Financing for Infrastructure</td>
</tr>
<tr>
<td>Thailand Poultry</td>
<td>Feeds, Vaccines, Breeding Stock</td>
<td>Financing through Contract Farming</td>
<td>Major Direct Investment</td>
<td>Farm Management Training; Food Technology R&amp;D</td>
</tr>
<tr>
<td>Argentina Beef</td>
<td>Breeding Stock</td>
<td>Direct Investment</td>
<td>Direct Investment</td>
<td></td>
</tr>
<tr>
<td>Chile Fish</td>
<td>Off shore Fishing by Foreign Vessels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand Tuna</td>
<td>Processing Equipment</td>
<td>Fishing by Foreign Vessels</td>
<td>Direct Investment</td>
<td>Management Training</td>
</tr>
<tr>
<td>Thailand Shrimp</td>
<td></td>
<td></td>
<td></td>
<td>Technology/Management Training; Food Technology R&amp;D</td>
</tr>
<tr>
<td>China Shrimp</td>
<td>Seedstock Production Joint Venture</td>
<td></td>
<td></td>
<td>Technical Assistance</td>
</tr>
<tr>
<td>Brazil Soybeans</td>
<td>Seeds, Tractors</td>
<td>Direct Investment</td>
<td>Major Direct Investment</td>
<td>Technology Training Donor financing for infrastructure</td>
</tr>
<tr>
<td>Argentina Soybeans</td>
<td>Seeds, Tractors</td>
<td></td>
<td></td>
<td>Technical Assistance</td>
</tr>
</tbody>
</table>
3.58 In virtually all of our focal cases in Latin America, credit from foreign distributors or direct foreign investments in production and/or processing and marketing facilities played a major role in the initial subsector growth. It was less important in our other cases (except for Thai poultry) and generally occurred in later stages of subsector development, serving to alleviate an existing bottleneck (e.g. feed shortages and high prices in the Chinese shrimp industry) or to augment the operating capacities of already competitive industries. In all of the focal cases, local companies have continued to account for a majority of exports, with multinational corporations accounting for 25% or more of exports only in four cases—Chilean fruit, Thai poultry, and Brazilian FCOJ and soybean.

3.59 Most of the subsectors initially relied upon imported technologies in the forms of planting materials, seed and breeding stocks, tractors, and processing plant and equipment. In most cases, at least some of these inputs and technologies were subsequently produced locally, either through licensing arrangements or through direct investments by international suppliers. Transfers of important technologies have also taken place through university or private training programs and joint or foreign programs of food technology R&D. In this regard, the most notable case is that of Chilean fruit.

3.60 Bilateral or multilateral development finance organizations appear not to have played any role in directly supporting production and marketing of the focal commodities. However, at least in the cases of Israeli citrus, Chilean fruit, and Brazilian soybeans and FCOJ, loans or grants from such institutions did contribute to the development of production, marketing, and/or transport infrastructure (e.g. irrigation facilities; rail/port facilities) which was subsequently used for the focal commodities, among others.

IV. Summary and Lessons

4.1 This study has provided a synthesis of fifteen "successful" food commodity systems in nine middle- and low-income countries. All the cases have involved competitive exports of high-value food products, either spanning several decades or occurring during the 1980s in response to market opportunities. In a number of cases, the focal country has become the leading or dominant player in world markets. While the focal commodity systems experienced their initial 'take-off' periods at different times and have certainly been influenced by country- and time-specific factors, several common features can be identified in the development contexts and patterns of the focal commodity systems.

4.2 Regarding the development context, each faced very favorable international market conditions during their 'take-off' stage and for many subsequent years. This combined at least two of the following three elements:

1) a generally upward trend in international demand and prices as a result of rising incomes, relatively high income elasticities of demand, increased health consciousness, consumer desire for dietary variety, and quality improvements,

2) multi-year periods of substantial market undersupply ("market vacuums") due to trade embargoes or to adverse weather conditions, political instability, or other problems faced by traditional suppliers, and

3) the prior build-up of considerable consumer product awareness and distribution channels within industrialized country markets before our focal commodity systems sought entry or expanded trade into such markets.
4.3 In addition, most of the focal commodity systems faced a favorable macroeconomic and policy environment at the time of their initial 'take-off'. This does not mean that this favorable macroeconomic/policy environment was sustained in subsequent years. In fact, several of the case study countries have experienced extended periods of high inflation, currency overvaluation, and low rates of investment and economic growth over the past two decades, with producers of the focal commodities being taxed directly and/or indirectly. While Taiwan (China) and Thailand have had a generally favorable environment for export and non-traditional agricultural development over most of the past two decades, the initial export booms experienced for Chilean fish, Brazilian FCOJ and soybeans, and Chinese shrimp occurred in the wake of or parallel to significant macroeconomic and/or trade reforms. The collective experience does suggest that an already well-developed commodity system can survive and retain its international competitiveness during a period of macroeconomic instability and uncertainty as long as it has an underlying low cost operating structure, a modern infrastructure, and strong international market (and marketing) links.

4.4 Several common ingredients were needed for the competitive responses to favorable international market conditions. These were:

a) favorable natural endowments (e.g. land and water resources, temperature and sunlight patterns, geography, etc.) which provided initial production opportunities, lowered costs, and/or enabled extended or counter seasonal supply patterns.

b) strong human capital—combining abundant supplies of inexpensive field and factory labor with a well-trained, experienced, and motivated cadre of managerial and technical personnel.

c) well-developed physical infrastructure—combining general facilities for trade (e.g. roads, railways, ports, telecommunications) with the production, processing, and storage infrastructure needed for the specific commodities. In many cases, the focal commodity systems benefitted from production and marketing infrastructure previously put in place for other commodities or uses.

d) the capacity to effectively develop and/or adapt imported production and processing technologies so as to attain cost efficiency and meet (or exceed) international quality standards. Such technology development or adaption was effective because of the limited restrictions placed on imported technologies, the strength of local research programs, and, at least in the Latin American cases, the very similar agroclimatic conditions between the major production areas and producing areas within the United States.

4.5 Another common factor contributing to the rapid and sustained supply response to international market opportunities was the prior or parallel development of complementary industries which lowered input or investment costs or created additional demand. Hence, the production and marketing infrastructure developed initially for wheat in both Brazil and Argentina was subsequently used also for soybeans, sharing overhead costs among the two crops. Thailand's well-developed feed industry supported both poultry and shrimp industry development. The well-developed processing equipment industry in Taiwan (China) provided that country's food processing firms which flexibility in shifting between processing methods and product lines. On the demand side, the Brazilian soybean industry benefitted from as well as contributed to the development of a local poultry industry requiring feeds (e.g. soybean meal). Both the Israeli citrus and Chilean temperate fruit trades benefitted from the development of domestic fruit processing industries which absorbed surplus or second-grade fruit and which in the former case, has become the dominant market outlet.
4.6 On the institutional front, there are several common as well as divergent patterns. In nearly all of the focal cases the private sector has played a dominant, if not exclusive role in commercial production, processing, and trading activities. The two primary exceptions are for Chinese shrimp and Israeli citrus, although in the latter case private and cooperative firms initially developed the export trade and remained the major traders for fifty years. In a few other cases, government agencies have played a supplementary trading role, either in procuring and maintaining stocks for price stabilization purposes or in undertaking limited export trading activities. Both multinational corporations and local firms have been active in virtually all of the focal commodity systems, with the latter accounting for a majority of exports in all cases but one (e.g. Thai poultry).

4.7 In the vast majority of the focal cases, governments have provided facilities and services which either have public good properties, give rise to externalities, or exhibit large economies of scale. Hence, governments have generally invested in port and rail facilities, roads, large cold stores, and terminal/auction markets, without which little trade can be conducted. The development of public knowledge systems (combining research, training, and extension) also proved critical, especially in the initial 'take-off' of production and trade. Most of the focal commodity systems have also benefitted from government trade promotion efforts as well as government negotiation of favorable terms for international market access. Some form of market information service and quality control/licensing system has been put in place by governments in most of the focal cases. Beyond these investments and services, there is considerable variability in the roles played by government in commodity system development. Over the past two decades, there has been relatively little microeconomic activism in the focal Chilean and Thai commodity systems and in Kenya's fresh vegetable trade. Elsewhere, there has been more substantial microeconomic interventions, most commonly through credit schemes, tax holidays and differentials, and subsidized material inputs. At least in the Latin American cases, these interventions have generally not compensated for the negative effects of adverse macroeconomic conditions and policies.

4.8 The review found that while nearly all of the commodity systems have featured a competitive and decentralized domestic marketing system, in most cases processing and export marketing operations have tended toward high levels of concentration, with between three and ten firms accounting for the bulk of capacity and trade. In some cases, such concentration patterns have derived primarily from economic factors (e.g. economies of scale; differential capabilities and performance; the effects of macroeconomic instability); in other cases, government interventions have directly contributed to such organizational patterns.

4.9 The review also found a common significance of contract farming and/or vertical integration in linkages between farm-level production and downstream processing and trade. Open market buying and selling of commodities or raw materials has become only a supplementary, market-clearing arrangement in many of the focal commodity systems. In many cases, the leading firms have developed their own programs of applied research, extension, input delivery, and credit as a supplement or replacement for markets and government programs for such services. Long-term contracts or intra-firm trade were also found to be significant features of export operations in the majority of the focal commodity systems. Such long-term marketing ties have helped to maintain market access, lower logistical and transaction costs, and facilitate flows of information and technologies which have enabled suppliers to better meet changing consumer and buyer tastes and requirements. These common features of trade suggests a need for more institutionally focused analyses of international trade patterns and developing country involvement and performance therein.

4.10 Table 18 below summarizes the major factors which contributed to the initial export booms of the focal commodity systems.
Table 18: Major Factors Contributing to Initial Commodity System Export Booms

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico Tomatoes</td>
<td>1960s</td>
<td>X</td>
<td>X</td>
<td>Minor</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Kenya Vegetables</td>
<td>1968-1975</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Israel Fresh Citrus</td>
<td>1930s Also 1960s</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Chile Temperate Fruit</td>
<td>1970s</td>
<td>X</td>
<td></td>
<td>Major</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Chile Processed Tomatoes</td>
<td>1980s</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Brazil FCOJ</td>
<td>1960s</td>
<td>X</td>
<td>X</td>
<td>Minor</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Argentina Beef</td>
<td>1880-1915</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Thailand Poultry</td>
<td>1980s</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Thailand Tuna</td>
<td>1980s</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Chile Fish</td>
<td>1970s</td>
<td></td>
<td></td>
<td>Major</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>China Shrimp</td>
<td>1980s</td>
<td>X</td>
<td>X</td>
<td>Major</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Thailand Shrimp</td>
<td>1970s</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Brazil Soybean</td>
<td>1964-1974</td>
<td>X</td>
<td>X</td>
<td>Minor</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Argentina Soybean</td>
<td>1970s</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Taiwan (China) Pork</td>
<td>1980s</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

(in 60s/70s)
4.11 In addition to the above findings, several general lessons can be drawn from this review of fifteen food commodity "success stories". First, agricultural export diversification by developing countries need not focus on exotic tropical commodities and need not depend upon low labor costs for international competitiveness. The collective experience suggests that developing countries can compete against industrialized country suppliers in the markets for a wide range of high-value and high-volume commodities on the bases of both cost and quality. Although such quality-based competitiveness did not occur overnight, with the liberal adoption/adaption of foreign technologies and advice, and with the build up of local skills, infrastructure, research capabilities, and experience, many of the focal commodity systems succeeded to match or exceed competitive quality standards within a decade after initial international market entry. While very small developing countries which lack the capacity to serve large distribution systems might need to focus on niche market supply, larger middle- and low-income countries should aspire to compete in larger and less variable food markets.

4.12 Second, successful export diversification often depends upon prior or parallel development of domestic markets. None of the focal commodity systems has developed as an export-oriented enclave and relatively few have relied upon export markets for the bulk or even the majority of their sales. In nearly half of the focal cases, export development followed upon many years of domestic market experience, during which infrastructure and institutions were built up, product quality improved, and experience gained in new product development, handling, and packaging. In these and several other cases, export booms were accompanied by a rapid growth in the domestic market which provided an outlet for blemished or local grade produce, an outlet for animal/fish parts or products which could not be exported, and an overall fall-back position in case of unforeseen barriers to export. This suggests that government and donor interventions geared toward agricultural export diversification should not only seek to build upon existing domestic marketing experience, but should also incorporate policy reform and investment components to further develop domestic markets.

4.13 Third, while there is no ideal organizational structure for commodity system development and export marketing, government (and donor) interventions in this area should comply with a few general rules. The appropriate structure depends upon the breadth and depth of local skills and experience, the technical characteristics of the specific commodity, the present and potential scale of exports, the distance to major markets, the country's market share in major markets, and other factors. Government policies and interventions should be generally geared toward encouraging competitive and flexible export marketing structures. This means that governments should: a) encourage new entry by prospective processors and trading companies, b) encourage (or at least not restrict) processors and traders to experiment with alternative institutional arrangements for stimulating raw material production and coordinating it with their own requirements, c) encourage the formation and functional diversification of cooperatives, trade associations, and similar collective institutions, d) streamline procedures for foreign direct investments, and e) reduce tariff and non-tariff barriers for the importation of planting materials and production, processing, and marketing equipment.

4.14 On the other hand, governments should not: a) 'pick winners' from among prospective or existing firms, providing favorable treatment to some and excluding others, or b) endow state (or any other) enterprises with monopoly export or trading rights. While such monopoly enterprises might be able to achieve economies of scale in logistics, promote a national brand name, and/or exercise market power wherever a country has a large market share, these same objectives can also be achieved under a competitive (yet concentrated) structure where there is voluntary cooperation in certain activities (e.g. international transport, promotion, etc.). Most export marketing boards have lacked operational flexibility, have adopted a production push- rather than market-orientation, and are averse to risk-taking, therefore not inclined to develop and implement marketing innovations. The state trading agencies operating in the focal commodity systems have proven to be adept at selling commodities to undersupplied markets, but not effective in cultivating additional demand, responding to market changes, or truly marketing products in competitive environments.
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# Appendix

The Development and Performance of Case Study Commodity Systems

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Case Studies

Mexico Fresh Tomatoes

As a result of favorable climatic conditions, relatively low labor costs, close geographical proximity, and strong linkages between growers and distributors, Mexico has become a primary winter season (December-April) supplier of fresh vegetables to the United States market. While the U.S. has imported more than a dozen different winter vegetables from Mexico, by far the most important—accounting for nearly one-half of the value of trade, has been fresh tomatoes. The long-term development of Mexico’s fresh tomato exports to the U.S. is an interesting case of dynamic changes in developing country competitiveness and access to a major industrialized country market.1

The Mexican-U.S. trade in winter fresh vegetables dates to the early part of this century, when a rail link was established between Nogales, Arizona and the northern part of the Mexican state of Sinaloa, and when several private entrepreneurs invested in irrigation systems and vegetable production. Still, production and trade remained very limited through the 1930s, with Sinaloa’s vast irrigation potential remaining largely undeveloped.2 While production and trade did increase during World War II, substantial growth did not occur until the 1950s, following major investments in irrigation infrastructure by the Mexican government and the completion of a highway system between Nogales and Culiacan in Sinaloa.3 When Florida, the largest supplier of winter fresh tomatoes, experienced a severe frost in 1957, Sinaloa growers responded to the rising prices by exporting more than 100,000 tons. When Florida recovered and prices fell, so did the supplies and profits of the Mexican growers. Considerable instability in prices, exports, and profits characterized the industry through the 1950s and early 1960s.4

Mexico’s tomato exports to the U.S. increased sharply from the mid-1960s to the early 1970s, with Mexico’s share of the mid-winter (January-March) market increasing from 32.6% in 1965 to 58.3% in 1973. Only an overvalued peso and improved weather conditions and productivity in Florida prevented Mexican growers from further eroding Florida’s market position during the mid-to-late 1970s.5 Several economic and political factors contributed to the major growth in Mexican exports. These included:

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2 There are eleven large rivers running through Sinaloa, which could provide virtually the entire state with access to surface water.

3 Tomato production occupied only a small proportion of the planted irrigated area in Sinaloa, with the leading crops being corn, sorghum, sugar, and cotton. This pattern remains to this day, although tomatoes account for a large proportion of the agricultural value for the state.

4 See Mares (1987), especially Chapter 7.

5 The rising Mexican market share in the late 1960s led Florida growers to seek protection against imports via measures to alter the required sizing, grading, packaging, and labelling for fresh tomatoes. The Mexican growers were able to comply with the measures, instituted under the Marketing Orders Act. See Mares (1987) for details on this and other attempts to restrict Mexican vegetable supplies into the U.S. market.
1. the 1962 U.S. embargo on trade with Cuba, traditionally an important supplier of winter vegetables (especially tomatoes),

2. the 1964 U.S. termination of the Bracero Program which had facilitated the migration of Mexican laborers to the U.S. to work in agriculture and industry. The return of this labor to Mexico led growers in both California and Texas to give up risky winter season tomato production.

3. a large inflow of U.S. capital and technical expertise to Mexico, with many partnerships or contractual ties formed between Sinaloan growers and Nogales-based distributors.

4. the weakening of Florida tomato production by periodic frosts, rising labor costs, and rising land costs (due to rapid real estate development),

5. a reversal of a prior stagnation/decline in U.S. fresh vegetable consumption, with increased health consciousness and improved distribution systems stimulating increased demand for salad vegetables, and

6. measures by Mexican growers, under the auspices of the National Commission of Vegetable Producers (CNPH), to regulate production and exports so as to prevent oversupply, improve quality, and therefore increase grower profitability.

Mexico’s strong competitive position derived from its considerably lower production costs, its greater supply reliability (due to the virtual absence of frosts in Sinaloa), and the quality of its product. With wage costs less than one-fifth those in the United States, with lower land costs, and with water supplies heavily subsidized by government, Mexican pre-harvest and packing costs were one-half or less those of Florida producers, even though the latter attained much higher yields. Low labor costs enabled Mexican growers to produce vine-ripened tomatoes, rather than (the less labor-intensive) mature green tomatoes (as in Florida) which were criticized by consumers as “cardboard tomatoes”. However, Mexico’s production cost advantage was countered by its far higher transport and distribution costs (including U.S. customs duty), rendering Mexican supplies competitive only in the western part of the United States. In the early 1970s as well as today, the vast majority of Mexican tomatoes are marketed in Los Angeles, San Francisco, and several other western U.S. cities.

Since the mid-1970s the profitability of Mexican tomato exports and Mexico’s competitiveness in the U.S. market have fluctuated as a result of changes in weather, adjustments in the exchange rate for the Mexican peso, shifts in Mexican government agricultural pricing and input policies, and changes in the relative costs between Mexican and Florida production. Mexican fresh tomato exports to the United States have remained within range of 275,000 to 350,000 tons, retaining about 50% of the winter market and thus one-fourth of total annual U.S. tomato consumption. While there have been new market entrants, Mexico has remained the dominant supplier of winter vegetables to the U.S. accounting for more than 95% of imported tomatoes. In recent years, Mexican firms have increased exports to Canada and to Western Europe.

Hence, by the early-to-mid-1970s the Mexican industry had reached maturity, with well developed channels for input and credit supply and for product distribution in the United States. This mature industry could survive the macroeconomic instability of the 1980s, the reduction in government subsidies for water and production inputs, and repeated attempts by Florida growers to restrict Mexican access to the U.S. market (e.g. the ‘tomato wars’). Effective horizontal and vertical coordination helped to sustain Mexico’s exports and grower profitability.
While export growth has levelled off, Mexican tomato production has continued to expand at a rate much higher than overall agricultural production. A large expansion has occurred in domestic fresh tomato sales and in production of tomato paste both for export and local markets. While tomatoes form part of the traditional Mexican diet, the continued expansion in production has led per capita consumption to reach levels 50% or more higher than that in the United States. Currently, some 70% of total Mexican production is directed to the domestic market, with the share approaching 50% even from the traditionally export-oriented Sinaloa. With increasing incomes, demand for higher quality has also increased, providing opportunities for direct marketing through supermarkets and in some years leading domestic market prices to match those obtained for exports.

The Mexican fresh tomato industry has several negative dimensions. First, while tomato yields have improved, they still lag well behind those in Florida, despite the planting of similar varieties and the better weather conditions in Sinaloa. Second, while the local market is developing rapidly, it remains constrained by weak infrastructure, including poorly designed and non-hygienic wholesale market facilities. Third, Mexico’s fresh vegetable export industry remains very narrowly based with no more than 22,000 growers participating nation-wide (e.g. 0.5% of 45.5 million farmers). The fresh tomato export industry is even more narrowly based. While there are ostensibly 80-100 growers, in fact, only a few dozen individuals or companies control the bulk of production with the other ‘growers’ added to the lists in order to bypass official maximum planting limits. The tomato export industry is largely confined to the Culiacan Valley in Sinaloa.

Sources: Froman (1980), Buckley (1986), and Cook et al. (1991)

6 In the 1980s, the average growth rate for tomato production was 3.7% compared with 1.5% for all of agriculture.

7 Cook et al. (1991), p.269.

Kenya 'Off-season' and Specialty Fresh Vegetables

Over the past three decades, a large trade in 'off-season' temperate vegetables and non-traditional vegetables has developed with many Mediterranean, African, and Southern Hemisphere countries as suppliers to West European markets. This trade, encompassing dozens of different vegetables, was stimulated and facilitated by: 1) the increased affluence, health consciousness, and foreign travel of West European consumers, 2) improved technologies and institutional arrangements for the distribution of fresh produce within Europe, 3) the emergence of large immigrant communities from Mediterranean, Asian, African, and Caribbean countries in several European countries, 4) programs in supply countries to diversify agricultural exports, and 5) increased air carrier linkages between Western Europe and other regions and improved airfreight technologies for handling perishables.

Among developing countries, one of the longest standing and diversified fresh vegetable export trades to West Europe is that of Kenya. A Kenyan cooperative, the Horticultural Cooperative Union, actually pioneered the European 'off-season' vegetable trade in 1957 when it sent small consignments of green beans, sweet peppers, chillies, and other commodities to a London-based broker who sold the produce to up-market hotels, restaurants, and department stores. Although Kenya's 'off-season' and specialty vegetable trade was in later years far surpassed in scale by those of Israel, Morocco, Egypt, and several other countries, Kenya has outperformed all Sub-Saharan African countries in this market and has retained a very strong competitive position in the markets for certain high-quality, high-value commodities, servicing niche markets.

Kenya’s high-value fresh vegetable exports grew out of an earlier domestic and regional market for less perishable items (potatoes, onions) and the development of a market for quality vegetables to service the country’s settler population and emergent tourist industry. With the opening of air carrier links to London and to Aden, HCU and several private wholesalers sought international market outlets. With limited freight capacity and limited investment in irrigated production, this trade would remain very small through the 1960s.

The 1970s witnessed a steady and considerable expansion of this trade, supported by private investments in irrigation facilities, a major increase in the available air-freight space (with a booming tourist industry and the introduction of wide-bodied carriers), and the development of long-term trading linkages between Kenyan exporters and Europe-based distributors. Kenya emerged as one of Europe's leading suppliers of high-quality sweet peppers, courgettes, and french beans, and the major supplier of a diverse array of 'Asian vegetables' (e.g. okra, chillies, karela, dudhi) consumed by the U.K.'s rapidly growing immigrant communities from South Asia and elsewhere. Kenyan firms were favored suppliers as they could provide a basket of several dozen different specialty vegetables on virtually a year-round basis, while competitors had a more limited product mix and more seasonal supply. While the U.K. was the dominant market outlet (due to the immigrant market, more direct flights, and closer business and/or familial ties), Kenyan firms were also competitive in several continental markets.

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9 This case is based on Jaffee (1990). More extensive analysis of the development of the sub-sector and its organizational patterns is provided in Jaffee (1992).

10 Trade was conducted in fresh tropical and temperate fruits as well.

11 Both the colonial government (up to 1963) and that of independent Kenya regarded the fresh produce export trade as having little potential due to Kenya's long distance from major markets and the perception that this trade was too risky and technically demanding for Kenyan producers and traders to undertake.
Kenya’s comparative advantage was based on its low labor costs, the country’s location straddling the equator, and its diverse agro-ecological conditions. These facilitated the development of a diverse product range, the spreading of supplies over much of the year, and the achievement of relatively high quality produce through larger allocations of labor to harvesting and other tasks. While Kenya’s airfreight costs were held below some competing countries by government fiat, Kenya’s strength in the market was not its lowest cost, but its greater continuity and higher quality than most of its developing country competitors. With the leading Kenyan exporters being of South Asian ethnic origin, the country was particularly well placed (in terms of product knowledge, consumption trends, and trade contacts) to penetrate and develop the market for traditional vegetables amongst Europe’s immigrant communities. The fresh vegetable export trade also benefitted from the rapid development of Kenya’s tourist trade and its vegetable processing industry as these provided remunerative outlets for surplus production or production not meeting export standards.\textsuperscript{12}

The 1980s brought mixed results to the fresh vegetable trade. On the one hand, Kenya lost its market for several temperate vegetables (e.g. sweet peppers and courgettes) due to higher quality or greatly lower cost supplies from within Europe or from Mediterranean countries. On the other hand, Kenya expanded its trade in french beans, increasing its market share in several countries and obtaining price premiums for quality over nearly all suppliers with a favored niche in the market. While there would be many competitors, Kenya also fared well in specialty vegetable market. Both for beans and for ‘Asian vegetables’, several Kenyan suppliers succeeded in breaking into the distribution channels of supermarket chain networks where the largest growth in trade has occurred. From the stable base of vegetable exports (and wholesaling), several leading exporters have diversified into other product lines including tropical fruits and cut flowers.

Another important development over the past decade was the incorporation of many thousands of smallholders into export-oriented operations. While once the vegetable export trade had a narrow base, with only a few dozen medium-to-large-scale growers, it now provides an important source of income and employment to many people and has had positive multiplier effects in several parts of the country.

\begin{center}
\begin{tikzpicture}[scale=0.8]
\begin{axis}[
    title={Kenya Fresh Vegetable Exports},
    xlabel={Year},
    ylabel={Quantity (000s of metric tons)},
    xmin=1970, xmax=2000,
    ymin=1, ymax=20,
    ytick={1,5,10,15,20},
    yticklabels={1,5,10,15,20},
    grid=major,
]
\addplot [mark=diamond*] coordinates {
    (1970,1)
    (1975,5)
    (1980,10)
    (1985,15)
    (1990,20)
    (1995,18)
    (2000,15)
};
\end{axis}
\end{tikzpicture}
\end{center}

Source: Kenya Horticultural Crops Development Authority

\textsuperscript{12} Export-oriented vegetable production forms only a small proportion of total vegetable production in Kenya. None of the major vegetables produced for local consumption (e.g. carrots, cabbage, kale, onions) are exported in any significant quantities, while most of the exported vegetables have very small local markets (outside of the tourist and processing industries).
Israel Fresh Citrus Fruit

Despite very limited natural resources, considerable distances to major international markets, a tiny domestic market, and the dislocations of several major wars, the area now constituting modern-day Israel supported a large and internationally competitive fresh citrus trade for approximately a century, from the 1880s to the 1980s. Our focus here is on the sustained growth of Israeli citrus production and fresh exports between 1950 and 1980 and its subsequent decline. During its favorable development years, this subsector nurtured one of the world’s most recognized name brands for fresh produce (“Jaffa”) and exported through a marketing organization (the Citrus Marketing Board) which was viewed by many outside observers as one of the world’s most effective state-run or-sanctioned trading organizations.

While citrus production in the area dates back about a thousand years, Israel’s citrus export trade has its origins in commercial plantings made in the Jaffa and Petah Tikva areas between the 1860s and 1880s. An export trade, featuring orange sales to England (and secondarily to Egypt) and lemon sales to Russia, developed steadily between 1880 and World War I, reaching 30,500 tons in 1913. Following a disruption during the war and a slow recovery in the early 1920s, citrus production and trade in British-ruled Mandate Palestine underwent a boom. This boom was based on both private and public investments, especially in irrigation, in packing houses, and in a deep water port with facilities for refrigerated shipments. Citrus plantings increased nine-fold between 1926 and 1936, leading the colony to become the world’s fifth largest citrus producer. With Spain embroiled in civil war, Palestine became the world’s premier citrus exporter in the late 1930s, with shipments to Europe exceeding 500,000 metric tons. Fresh citrus exports accounted for nearly 95% of the colony’s agricultural exports and 75% of its total merchandise exports. While the citrus trade was diversified to include sales of grapefruit (formerly virtually unknown in Europe) and sales to several continental European markets, the subsector was plagued by declining export prices, partly a consequence of the poor coordination among the colony’s many private and cooperative exporters.

Both World War II and the subsequent war of 1948 greatly disrupted citrus production and trade. Irregular sailings to Europe and the devastation there cut down war-time shipments from eastern Mediterranean citrus suppliers to minimal quantities. While some exports were made to Egypt and while a domestic processing industry expanded to utilize the available raw materials, much of the citrus production went unharvested for several years and many orchards were neglected or abandoned.

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13 On the early origins of citrus cultivation in the area, see Tolkowsky (1928).
14 The development of Palestinian citiculture and citrus exports during this period is examined in Ryerson (1928), Hazen (1938), and Chorin (1966).
15 In the 1920s and 1930s, several attempts were made by the colonial government and various private and cooperative firms to undertake voluntary cooperation in the areas of quality control, shipping, brand name promotion, and sales. While some effective measures were taken and some mergers of marketing firms did occur, the overseas sales activities of most firms remained competitive with one another, eventually driving down prices sharply in the late 1930s.
16 The colonial government did provide war-time loans to growers for the maintenance and rehabilitation of citrus orchards, but the funds available were not adequate for the task.
17 The Palestine citrus processing industry actually dated to the late 1920s and early 1930s when several private firms and cooperatives set up small factories. The origins, war-time, and subsequent development of this industry are discussed by Hazen (1938), Nathan et al. (1946), and Levie (1962).
In the immediate post-war years, attention focused on rehabilitation of orchards, packing houses, transport facilities, etc., made possible in part by a loan from the U.S. Export-Import Bank. In 1947, a Citrus Marketing Board was established and granted export marketing rights. It would utilize the pre-war private and cooperative exporters as "contractors" for procuring and packing the fruit.

By the early 1950s, Israel was experiencing rapid economic growth, fueled by large capital investments and a massive immigration. The citrus subsector, still the leading source of foreign exchange earnings, also underwent a boom which would continue through the mid-1960s. Significant private and public sector investments were made, resulting in an expansion of the planted area of citrus from less than 14,000 hectares to over 40,000 hectares, the modernization and greater centralization of citrus packing, improvements in quality control and transport infrastructure, a large expansion in the capacity of the domestic processing industry, and the development of an overseas network of trading offices and distribution depots.

With West European citrus demand growing rapidly and with Mediterranean citrus production recovering slowly, a seller's market prevailed into the mid-1960s. With the Citrus Marketing Board controlling market outlets and distribution channels, with sales made under the well recognized and respected "Jaffa" label, and with the benefit of several devaluations of the Israeli currency, the earnings realized by local growers were very favorable. Israel's world (and Mediterranean supplier) market shares for oranges and grapefruits rose steadily through the 1950s and 1960s. With market shares for oranges and grapefruit of more than 25% in certain markets and in certain months, Israel's single exporter cartel (e.g. the Citrus Marketing Board) had a strong bargaining position vis-a-vis foreign buyers and agents.

Although Israeli citrus production and exports continued to expand through the late 1970s, the subsector began to face increased difficulties in selling its fruit abroad as a result of increased competition from other Mediterranean suppliers (principally Spain, Morocco, and Cyprus) and changing consumer tastes. The Citrus Marketing Board, previously an effective 'seller' of fruit to markets with already developed citrus demand, needed to re-orient itself to being a 'marketer' of fruit, nurturing new demand patterns. While the Board launched successful citrus consumption and utilization campaigns in several countries, it could not sell (at remunerative prices) the greatly increased output from the country's

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18 Several factors contributed to the establishment of the board, including a) recognition of the adverse effects of the pre-war fragmented and uncoordinated trade structure, b) an objective to achieve economies of scale in logistics and in overseas promotion and product distribution, and c) the fact that many European countries were conducting their post-war imports through centralized government agencies. See Melamed (1979) on the genesis of the Citrus Marketing Board.

19 Most of the citrus area of Mandate Palestine came under the jurisdiction of Israel in 1948.

20 The share of fresh citrus fruit in total Israeli exports declined from 63% in 1949 to 38% in 1957 to 14% in 1965 (Annual Statistical Abstracts, Israel Bureau of Statistics).

21 Citrus production would initially be a primary source of revenue for many of the new agricultural collectives (kibbutzim and moshavim) established during the 1950s and 1960s.

22 Private and cooperative investments were made in orchards, packing houses, and processing facilities, while government investments were made in port facilities, including large cold stores.


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maturing orchards and had to direct a larger proportion of fruit to the processing industry. The Board, which for a variety of reasons played little to no role in the planning of the earlier planting boom, found itself with a product mix which was becoming less favored among European consumers. While consumers indicated a preference for 'easy peeling' oranges and tangerines and for the sweeter red grapefruit, the Board's product line was dominated by the traditional Shamuti (Jaffa) orange and by white grapefruit.

The 1980s witnessed a major decline in the international competitiveness and profitability of Israel's fresh citrus exports. In the course of the decade, more than 20% of the planted citrus area was uprooted, more than half of the country's packing houses were mothballed, export volumes fell below their levels of the early 1960s and late 1930s, and pressures mounted to have the Citrus Marketing Board disbanded. With fresh citrus exports declining rapidly and with grower and packing groups pressing for the right to undertake their own marketing, the Citrus Marketing Board export monopoly was rescinded in 1991.

Source: Statistical Abstracts of Israel; Citrus Marketing Board of Israel

Several factors contributed to the major decline in Israel's fresh citrus trade during the 1980s. Among these included: 1) the rapid cost inflation which the country (and subsector) experienced during the early-to-mid-1980s, 2) the strength of the US $ (the accounting unit for the CMB) vis-a-vis European currencies in the early 1980s, 3) a significant rise in international shipping costs during the early 1980s, 4) the general financial crisis experienced by many of Israel's agricultural settlements, 5) the continued

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24 The volume of citrus fruit directed by the CMB to the processing industry increased from 215,000 tons (or 23.7% of total production) in 1965/66 to 747,000 tons (44% of production) in 1973/74. As the price paid by processors was far lower than that paid by the "contractors", grower revenues were adversely affected.

25 Although the growing appeal of 'easy peelers' and red grapefruit in the European market was recognized by some Israeli industry insiders in the 1960s, confidence in the continued appeal of Israel's traditional product mix, led to very limited and ad hoc allocations of funds for research into new varietal development through the 1970s.
improper product mix for exports with only small quantities of the favored varieties being available,
6) conflicts of interest within the subsector which translated into weakened incentives for product
innovation and quality improvement, 7) an inability on the part of the Citrus Marketing Board, largely
for legal and political reasons, to restructure the trade in the face of foreign and domestic challenges so
to maintain competitiveness and profitability, and 8) an expansion and quality improvement in Spanish
citrus production.

With the rapid decline in fresh exports, the processing industry has become the primary outlet
for citrus fruits, taking about two-thirds of total production during the past few years. In 1990, the
industry, consisting of some two dozen private and cooperative firms, absorbed over one million tons of
citrus fruit. Israel's exports of processed citrus products (including concentrated juices and bases, essential
oils, fruit segments, and other products) first exceeded the value of fresh citrus exports in 1984 and are
now more than double those of fresh fruit. Local advances in food technology and the supply of tailor-
made products has enabled this industry to be competitive internationally, despite the fact that many of
Israel's main citrus varieties are not well suited for processing. With the more general restructuring of
the citrus sub-sector, attention is now being directed to the potential for developing orchards specialized
for supplying raw materials to processors, as is the pattern in the Florida and Brazilian processing
industries.

**Brazil Frozen Concentrated Orange Juice**

The production, consumption, and trade of processed citrus products (including juices, segments,
and bases) are a post World War II development. The processed citrus product industry has been a
leading source of growth in the world citrus economy over the past few decades. The most important
processed citrus product--frozen concentrated orange juice (FCOJ), experienced double-digit annual
growth in world trade volumes during the 1970s and 1980s. At present, nearly 40 percent of world citrus
production is processed.77

Through the 1960s, the United States (particularly the state of Florida) was the dominant world
producer and trader of FCOJ and other processed citrus products. This pattern has changed significantly,
as a result of repeated climatic shocks in Florida and the development of production in several low- and
middle-income countries. The most dramatic change has been the emergence of Brazil's FCOJ industry
as the leading producer and exporter of this product. Over a period of just two decades, Brazil's industry
was transformed from an essentially cottage industry to one with export sales exceeding $1 billion and
accounting for 80% of the world market.78

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76 While Israel exported more than twenty-five different citrus varieties in the mid-to-late 1980s, more than
85% of export volumes in most years were taken by Shamuti oranges, white grapefruit, and Valencia lates.
While technical improvements have been made, none of Israel's 'easy peelers' have the characteristics of such
varieties which are favored by distributors and consumers (CMBI Annual Reports and interviews with CMBI
Agro-Technical advisors).


78 This market share does not take into account re-exports, of which there are substantial quantities in
international trade, especially within Europe.
Citrus production in Brazil dates back to the 16th Century. Between 1860 and the late 1930s, immigrant farmers and traders developed an export trade in fresh oranges and other citrus fruits, mostly geared toward European markets. While an outbreak of Tristeza disease destroyed several million orange trees in the late 1930s, the industry would later recover, re-initiate exports in the 1950s, and develop a large domestic market for fresh citrus fruits.

A harsh winter in 1962/63 sharply reduced the production of oranges (for processing) in Florida. This development stimulated several Brazilian and foreign fresh fruit importer/exporters to invest in orange juice processing facilities in Brazil, in anticipation of future market opportunities, especially in Europe. Between 1965 and 1973, the investment climate was quite favorable, with rising world FCOJ prices, favorable Brazilian exchange rate policies, negative real interest rates for rural finance, and tax and financial incentives for manufactured exporters. New investments expanded the industry's processing capacity and dramatically increased the area planted under orange orchards.

By the early 1970s, Brazil emerged as the world's leading exporter of FCOJ, although its total output of the product was still small compared to that of Florida. The 1973 oil price rise and the subsequent recession adversely affected world FCOJ demand and prices. This also ushered in a period of macroeconomic instability in Brazil with high rates of inflation, an overvalued currency, and a highly complex and shifting array of macroeconomic and sector policies. The FCOJ price drop and resultant government interventions led several Brazilian processors into bankruptcy and brought about a concentration in the industry. Still, with a subsequent improvement in international market conditions, and with the benefit of both industrial and agricultural sector subsidies, the remaining firms were able to weather the effects of an unstable macroeconomic environment and take advantage of Brazil's strong comparative advantage in FCOJ production.

A major turning point in the industry's development came in 1977 when a major freeze in Florida drove up FCOJ prices in the U.S. to a level permitting competitive Brazilian supplies even after the application of U.S. import tariffs. Brazil's processors responded quickly to this market opportunity. While previous exports to the U.S. (largely for product blending purposes) had rarely exceeded 20,000 tons/year, these exports shot up to 147,500 tons in 1978. When the Florida industry recovered in 1979, most of Brazil's expanded FCOJ production was successfully marketed in Europe.

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29 This paragraph is based on Citrograph (June 1985) "A View of Citrus Production in Brazil".
30 Brazil's domestic market has continued to expand and with total consumption of 3.37 million metric tons in 1988/89, it ranks second in the world after China (Cook 1991, Table I-2).
31 European markets which were less protective for juices than that of the U.S.. The prior introduction of concentrated juices (by U.S. suppliers) and its reconstitution in Europe had stimulated increased demand by lowering (transport) costs and by providing a product with better taste and quality. The Brazilian industry would import the emergent technology and piggy-back upon earlier market development efforts in Europe by U.S. exporters.
32 The area planted with oranges increased from 167,000 in 1967 to 449,000 in 1973 (Brandao and Carvalho (1991, Table 1.13).
33 Regarding comparative advantage, on-tree production costs for oranges (which account for 60-65% of the total costs for FCOJ) were roughly one-half in Brazil than in Florida from the mid-1970s to mid-1980s due to lower land and labor costs. Price controls on agricultural inputs, tariff rebates on imported machinery, and subsidized credit programs during the 1970s reduced the costs of critical inputs for the industry (Braga and Silber (1991, p.7).
The Florida industry subsequently encountered climatic shocks in 1981, 1982, 1983, and 1985, leading to a 50% reduction in orange and FCOJ production. World FCOJ prices nearly doubled, leading to considerable new investments in Brazil in orchards and in juice-processing and transport facilities. These investments, together with the maturation of earlier planted orange trees, enabled the Brazilian industry to respond to the massive increase in world (especially U.S.) import demand. Between 1980 and 1984, Brazil's FCOJ exports increased from 401,000 tons to 905,200 tons, becoming the dominant world producer and exporter. The industry's index of revealed comparative advantage (20.27 in 1985) was by far the highest among the major industrial exporting sectors in Brazil.\(^{34}\)

During the early-to-mid-1980s, Brazil's competitive position in major markets was enhanced by its processors' investments in bulk transport and storage technologies which considerably reduced international transport costs and facilitated improved distribution of FCOJ to industrial users within the importing countries.\(^{35}\) Processing costs have been reduced by large economies of scale and by the use of sugarcane wastes as a partial substitute for petroleum-based fuels.\(^{36}\) Also important was the

Sources: Braga and Silber (1991); U.S. Agricultural Attache Reports

\(^{34}\) Data from Braga and Silber (1991).

\(^{35}\) Use of bulk containers, specialized transport vessels, and 'tank farms' for storage and distribution has reduced transport costs by some $80-100/ton. It has also improved quality by reducing contamination and losses from heat (FAO 1989, p.17).

\(^{36}\) International Fruit World (1987, Vol. 3), p. 366. Brazilian processors have benefitted from the substantial plantings of three different orange varieties which generate large quantities of fruit over at least eight months of every year. This increases capacity utilization rates. Brazil’s major competitor in the citrus juice market, Israel, exhibits much shorter yielding seasons for its orange and grapefruit varieties suitable for juice-making.
development of long-term contractual or ownership linkages with major soft drink distribution companies
in the United States and Japan, providing assured market outlets.

Since the mid-1980s, the industry has maintained its dominance of European and U.S. markets
and has diversified its trade to cover more than forty countries. Peak production and exports were reached
in 1989 at 1,050,000 and 959,000 tons respectively. However, the industry's output, prices, and
profitability have been highly variable over this period as a result of unstable macroeconomic conditions,
shifting government policies and interventions, and problems in coordination between growers and
processors and among the latter in international trading strategies.

**Chile Temperate Fruits and Processed Tomato Products**

Chile has been able to use its comparative advantage in production (excellent agroclimatic
conditions, extended growing season and production cycles counter to those in the Northern Hemisphere,
and relatively low-cost labor) to respond to a significant and steadily upward trend in world demand for
fresh and processed horticultural products, particularly in the U.S., the EEC, and Japan. Booming export
earnings from the subsector exceeded $717 million by 1989, representing nearly 9% of Chile's
merchandise exports and 70% of its agricultural and livestock exports. Coverage is provided here for two
commodity systems—the temperate fruit system which has accounted for most of the expansion and the
system for processed tomato products which has undergone a rapid expansion in the past few years.

**Temperate Fruits**

Chilean exports of temperate fruit date to the 1920s, when small consignments of apples were sent
to North America. By the 1950s, when initial investments in cold storage and refrigerated transport were
made, small trades in table grapes and pears also developed. However, the industry was poorly organized
and remained insignificant in the rapidly expanding Southern Hemisphere fruit trade, then dominated by
Argentina, South Africa, Australia, and New Zealand.

This Southern Hemisphere temperate fruit trade would continue to expand rapidly during the
1960s, with Chile barely participating. Investment in fruit production and trade was undermined by
widespread rural labor unionization, a significantly overvalued currency, inefficient transport and port
handling, and heavy government controls on both imports and exports. The change in government
in 1974 was followed by a devaluation of the peso, a liberalization of the trade regime, a reversal of the
labor unionization process, and an implementation of reforms in the banking, research, and other sectors.
These policy changes, together with an inflow of capital from international development institutions,
provided an impetus to private sector investment in the Chilean agriculture and industry.

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37 USDA "Horticultural Products", various issues.

38 Southern Hemisphere exports of apples increased from 336,000 in 1959-61 to 549,000 tons in 1969-71
with Chile's exports increasing only from 9000 to 18,000 tons (FAO Trade Yearbooks).

Investment in fruit production increased substantially in the mid-to-late 1970s, with the planted area growing 30% and fruit production increasing 51% between 1973/74 and 1980/81. The industry faced favorable international market conditions with U.S. and EEC import demand for temperate fruits continuing to expand, while the export industries of Argentina, South Africa, and Australia encountered financial, technical and/or political problems, leading to a stagnation or decline in shipments. With the presence of similar growing conditions in California and with many Chileans obtaining their scientific training at the Californian agricultural universities, many of the production technologies used in California’s fruit industry were effectively transferred to Chile. This resulted in a significant improvement in Chilean yields and product quality, especially for table grapes. The Chilean industry also benefitted from the fact that table grapes, apples, and other temperate fruits were well-known commodities for which demand was well-established in North America. Chile would merely extend seasonal availability, making use of existing distribution channels for domestic and imported fruits.

While adversely affected by the early 1980s recession, the Chilean fruit subsector experienced a boom during the mid-to-late 1980s, becoming the leading Southern Hemisphere temperate fruit supplier and the world’s leading exporter of table grapes. Taking the major temperate fruits together, Chile’s share of Southern Hemisphere exports increased from only 9% in 1974-76 to 25% in 1979-81 to 42% in 1987-88. Between 1980 and 1989, increases in Chile’s fruit plantings, production, and export volume were 102%, 154%, and 308% respectively—signifying that significant gains were achieved both in production yields and in the proportion of the crop of exportable quality.

Table grapes and apples account for the largest share of Chile’s fruit exports, although recent growth has been achieved in the exports of pears, nectarines, plums, peaches, and kiwifruit. With Chile’s labor costs only one-third to one-fourth those prevailing in New Zealand and Australia, Chilean fruit production has remained profitable despite a reduction in real prices, while many orchards in the other two countries are being uprooted. The decline in prices—which have largely been a result of Chile’s greatly expanded exports, will make it more difficult for other countries to enter this market. In addition to the partial crop diversification, the Chilean industry has moved to diversify the planted varieties of table grapes and apples so to extend the export marketing seasons for both commodities. While basing their early expansion on table grape exports to the U.S. market, Chilean exporters have successfully penetrated additional markets, each having different tastes, quality requirements, and commercial practices. New market outlets have been developed in Europe, the Middle East, the Far East, and Latin America. Expanded grape production has also given rise to a booming wine production and export industry.

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40 Disbursements of long-term credits through the development and commercial banks to fruit production increased from $1.3 million in 1974 to $17.7 million in 1977 to $40.2 million in 1980 (Barriga (1990, p.26).

41 This is discussed extensively by Jarvis (1991). The industry also benefitted from the adoption of Israeli drip irrigation technology.

42 I thank M. McMahon for pointing this out.

43 Includes apples, pears, grapes, kiwifruit, peaches, and nectarines (FAO Trade Yearbooks).

44 The share of production going for export increased from 33.6% in 1978 to 51.3% in 1987.

45 In 1989, the total cost (e.g. production + packing + shipping costs) of Chilean apples delivered to a final (wholesale) market point in the U.S. was $0.78/kg., compared with $1.07 for New Zealand. The costs differences for pears and kiwifruit were even greater. For pears, Chilean costs were $0.86/Kg. and N.Z. costs were $1.88/Kg.; for kiwifruit, the respective costs were $1.54/Kg. and $2.66/Kg. (World Bank documents)
Technological change both in production and in marketing has been rapid. While Californian technologies are still important, over the past decade Chilean universities and the semi-public, semi-private Fundacion Chile have developed a local research capacity and are training and employing many agronomists. Marketing technologies have also been upgraded, with the introduction of computerized temperature controls on packing sheds, electronic sizing, and advanced cooling techniques.

The fruit industry now generates gross annual foreign exchange earnings of nearly $700 million, provides employment for about 12% of the active labor force, and accounts for 46% of agricultural GDP. Its development has stimulated considerable private and public investments in storage and transport facilities, ports and airports, and communications infrastructure. It has also spawned the development of a large fruit processing industry which, in the future, may be able to take advantage of the already developed fresh produce marketing infrastructure and institutions to compete in international markets.

Processed Tomato Products

Chile's production and marketing system for vegetables is much less developed than that for fruit, with most production geared toward the domestic market. Production is of low-to-moderate quality and high post-harvest losses occur. Chile's exports of fresh vegetables have remained small and highly variable, with periodic sales of onions, garlic, and potatoes to deficit markets in Latin America. High airfreight costs have prevented Chile from being competitive in the U.S. market (vis-a-vis Mexico and Central American suppliers) for more perishable items.  

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46 A single exception is that of asparagus.
Chile's distant location from major markets has proven less of a disadvantage for processed vegetable products, principally tomato paste.\textsuperscript{47} Chile's trade in this product is relatively recent. In the mid-1970s, there was only one Chilean tomato processing company and its products were sold locally. With the idea of developing off-season production for the U.S. market, two U.S. companies provided technical support for improving Chilean product quality. Based on contracted production, several firms developed export-oriented operations. Still, Chile's position in the world tomato paste market remained marginal, with 1987 exports of 8982 tons accounting for only 1.2% of world trade.

The boost to Chile's industry came in 1988 when there was a sharp reduction in the U.S. tomato crop (and processing) and when a 100% tariff was placed on EEC canned tomato imports into the U.S.\textsuperscript{48} Although the tariff does not apply to tomato paste, the EEC’s paste sales have declined sharply. Chile was one of a few countries which took advantage of the sharp increase in U.S. imports and the reduced competition from EEC sources.

Between 1988 and 1990, Chile's tomato paste exports increased four-fold from 12,163 tons to 51,823 tons. In the latter year their value reach $48.8 million, placing Chile sixth in world exports, with a market share of 5.4%. Chile not only increased its share of the U.S. market (to reach nearly 25% in 1989/90), but also expanded sales to Japan, South Korea, and Brazil.

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{chart.png}
\caption{Chile Tomato Paste Exports}
\end{figure}

Source: USDA Horticultural Products Review (April 1991)

\textsuperscript{47} This and the subsequent paragraph are based on USDA Horticultural Products Review, April 1991, p.18-22; and BESD data on world trade in tomato paste.

\textsuperscript{48} This was in retaliation for EEC restrictions on meat imports from the United States due to the use of hormones to enhance production.
Argentina Beef

The production and trade of beef has played a major role in the economic development of Argentina for nearly two centuries. In the 19th Century and through the 1920s, the sub-sector had a strong export orientation, first of salted meat and later for chilled beef. With the Depression, the establishment of the Commonwealth Preference System, and World War II, Argentina's international market for beef greatly contracted, stimulating the development of the domestic market.

While Argentina remains one of the principal beef-exporting nations in the world (ranked fourth in 1990 behind Australia, Germany, and the U.S.), since World War II, the greatest proportion of Argentina's moderately increasing beef production has been directed to the domestic market. Argentina remains the world's third largest beef producer (accounting for 5.4% of total world production in 1990) and has a per capita beef consumption which is more than 50% higher than that of the United States and more than three-times that for most West European countries. While Argentina has lost some of its traditional export markets for lower-value products (e.g. boned and manufactured beef) to subsidized EEC supplies and because of developed country market protection, the sub-sector has retained or even increased its exports of higher value products (e.g. boneless cuts, corned beef, cooked/frozen beef) which now account for over 90% of beef export value. Although now accounting for less than 10% of Argentina's total agricultural exports, beef exports still totalled $734 million in 1990. At least until recently, beef exports also provided one of the largest sources of government tax revenues.

The 'success' of the Argentine beef sub-sector over the past decade or two lies not in especially favorable trends in production, trade, or enterprise profitability, but in its ability to survive and maintain international competitiveness in a situation of rampant inflation, high interest rates, currency overvaluation, and overall macroeconomic uncertainty, heavy direct and indirect taxation against producers, processors, and traders, increased competition for resources from the Argentine cereals sub-sector, and growing subsidies and protection among its competitors or traditional markets.

Its sustenance stems from several factors, including: 1) Argentina's continued position as one of the world's lowest cost producers of quality beef (due to favorable climate and extensive grassland resources, 2) a well-developed, flexible and transparent livestock marketing system (which has provided numerous sales options and provided fast payments in an inflation-ridden economy), 3) innovations in domestic beef distribution (including supermarket sales of brand name products, vacuum packing, the development of butcher chain stores), 4) the development of new international market outlets (e.g. the Soviet Union in the early 1980s; Middle Eastern countries), and 5) debt rescheduling by official banks for livestock and beef processing and trading enterprises.

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49 Argentina's per capita beef consumption was 70-80 kgs. (carcass weight equivalent) during the 1980s, compared with 40-45 kgs./per capita in the U.S. and 15-25 kgs./per capita in West European countries. Uruguay is the only other country with per capita beef consumption exceeding 50 kgs. Data from USDA, World Livestock Situation, various issues.


51 World Bank documents.
With an improvement in Argentina's macroeconomic situation since the late 1980s, and with a reduction in export taxes and some capacity rationalization within the sub-sector, beef production and processing has returned to profitability. Since 1986, beef exports have also increased steadily.\footnote{Ibid.; USDA Agricultural Counselor reports (Buenos Aires).}

Sources: World Bank (1989); USDA Agricultural Attache Reports.

**Thailand Poultry**

Poultry is one of the world's major and fastest growing sources of meat.\footnote{This paragraph is based on USDA (1990), FAO Trade Yearbook data, and "Thailand Excels in Value-Added Broiler Meat Exports," Agribusiness Worldwide, Nov/Dec. 1991.} Over the past two decades, world poultry meat production has more than tripled, while world trade has increased at nearly 9\% per year. Two developing countries--Brazil and Thailand, are among the few countries which have developed large poultry processing industries involving significant international trade. We focus on the Thai poultry system as this has proven to be internationally competitive, both on the basis of low cost and of product differentiation. While the Thai industry has increasingly moved in the direction of high-value added, prepared products to meet special consumer preferences, the Brazilian trade has continued to be based primarily on exports of whole frozen birds.

For many years, poultry production in Thailand was a part-time, backyard activity of small farmers who consumed their output or sold it to small rural or urban traders. Birds were slaughtered manually and no formal processing or storage activities were undertaken. Per capita poultry consumption remained low, trailing far behind that for beef, pork, and fish.\footnote{UNCTAD (1986); USDA (1990b).}
This pattern changed dramatically during the early-to-mid-1970s. During this period, several feed milling companies integrated forward into poultry production, developed contractual ties with existing producers, and established slaughterhouses and modern processing facilities to produce high-quality frozen poultry for export. These firms drew upon imported technology in the areas of genetics, nutrition, and disease control and obtained technical assistance and capital from foreign investors. The Thai government offered investment incentives and research and quality control services, yet otherwise intervened little in the emergent industry.

During the 1970s, Thai poultry production nearly tripled from 64,000 to 188,000 metric tons. Exports grew from zero during the mid-1970s to nearly 25,000 metric tons in 1980, although the bulk of the expanded production went to domestic consumption. Still, the export-oriented component had a major impact on the entire industry by affecting the technologies adopted, the prices for birds and processed products, and the prevailing organizational patterns. As only a few parts of the chicken were exported (e.g. boneless breast and leg, filet, wing, and bone-in-leg), the export-oriented firms aggressively sought to further develop the local market.

![Thailand Poultry](image)

Sources: FAO Production Yearbook; UNCTAD (1986), USDA (1990, 1992)

Over the past decade, Thai poultry production and exports have boomed, in response to strong demand both domestically and in its main overseas market—Japan. Thailand has become the world’s fourth largest poultry exporter and the largest exporter of value-added cuts. Its share of world exports of broiler meat was 7.5% in 1991, up from only 3.4% in 1980. Thailand’s share of the rapidly increasing Japanese import market rose from 23% in 1980 to 37% in 1991, and the country has since surpassed the

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55 Before 1973, private firms were not permitted to operate poultry slaughterhouses in Thailand. On the background of the industry and its development during the 1970s, see UNCTAD (1986).

56 The data in this paragraph are drawn from USDA (1990a, 1990b, 1992) and FAO Trade Yearbooks.
U.S. as the leading supplier to this rapidly expanding market. Thailand's exports are predominantly of value-added products geared to meet particular Japanese consumer preferences. In addition to achieving high product differentiation, the industry has emerged as one of the lowest cost and technically efficient industries in the world. Production costs are estimated to be 26% lower than those in the U.S., while the Thai industry matches or exceeds the performance of most national poultry industries according to feed conversion, bird mortality, and other technical indicators.

The industry's competitive advantage has derived from several factors, including the country's ample and low-cost labor force (which is especially important for the labor-intensive process required to produce de-boned meat), the low-costs for slaughterhouse construction, the ample supply of domestically-produced feedgrains and fishmeal, the close proximity (e.g. low transport costs) to the Japanese market compared with most international competitors, the streamlined vertically-integrated and vertically coordinated production/processing systems which have developed, and strong involvement by Japanese companies in the industry, especially in processing and overseas distribution.

Thailand Tuna

In 1980, world consumption of tuna was stagnant, world tuna prices were depressed, and rising operating costs were leading to the closure of tuna processing facilities in the U.S., Japan, and Europe. Over the subsequent decade, world canned tuna imports would nearly quadruple from 110,000 tons to 437,000 tons, with large-scale canning operations shifting to several low cost developing countries.

The most dramatic growth in tuna processing and trade has taken place in Thailand. In 1980, Thailand did not export a single can of tuna. Ten years later, Thai canned tuna exports exceeded 225,000 tons, for a 51% world market share. The gross value of Thailand's tuna exports in 1989 were $537 million. Trade expansion was high and steady throughout the decade.

The Thai tuna industry is interesting not only because of its rapid development, but also because it is based predominantly on imported raw materials. Tuna landings by Thai vessels have rarely exceeded 30,000 tons, while Thai imports of frozen tuna (mostly skipjack) have increased past the 250,000 ton mark. It was in fact shifts in traditional fishing patterns which provided the initial basis for the Thai tuna canning industry. Historically, the eastern Atlantic and eastern Pacific oceans were the two most important fishing areas. Beginning in the late 1970s, however, U.S. vessels began to exploit the tuna resources of the western Pacific and European vessels moved to the Indian Ocean. The result of this shift would be a large increase in world tuna landings and a significant drop in tuna prices.

Thailand was well located to draw upon the expanded, low cost supplies of tuna from both the Pacific and Indian Oceans. In the early-to-mid-1980s several Thai fruit and vegetable canners and other entrepreneurs invested in large-scale, modern processing facilities which increasingly have been used for fish, especially tuna. Their operating costs have been relatively low due to efficient management, the availability of abundant low-cost labor, backward integration into can production, and efficient use of by-products from processing.

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57 This case study is based on Crough, C. (1991) "Recent Developments in The Tuna Industry of Thailand" (Infofish International 4/91), S. Suwanrangsi "The Seafood Industry in Thailand" (Infofish Int'l, 3/92), articles in GlobeFish, and discussions with Gert van Santen (World Bank).

58 World tuna landings increased from 1.7 million tons in 1980 to 2.5 million tons in 1988.
In order to gain access to and penetrate the expanding market segments of U.S. and European markets, Thai canners entered into co-packing arrangements with American and European firms. Later, Thailand's largest tuna processor took over the third largest tuna company in the U.S. (Bumble Bee Seafoods Co.), enabling it to take advantage of the latter's extensive distribution network and well-established brand names. Thai processors account for the largest shares of all major canned tuna import markets except the French, who until recently barred the Thai product in favor of Francophone African suppliers.

![Thailand Canned Tuna Exports Graph](image)

Source: FAO Fisheries Commodity Yearbooks

**Chile Fisheries**

Traditionally one of the world's largest exporters of fish meal, over the past decade the Chilean fisheries industry has expanded considerably and diversified into the production, processing, and trade of fresh, canned, and frozen fish. Expanded volumes of trade, together with steady development of higher-value products, resulted into a four-fold in fisheries exports from $225 million in 1979 to $896 million in 1989. The latter figure accounted for 10% of Chile's total exports and is equivalent to all of Chile's agricultural/livestock exports.

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59 Based on "Chilean Fisheries" in Infofish International (4/88), "South America Seeks Export Success", in Seafood International (4/92), and World Bank documents.
Chile has a favorable location and natural resource base to develop a competitive fisheries industry. The country's Pacific Ocean coastline stretches for 4300 kilometers. The Humboldt Current which reaches Chile's northern coast is very rich in nutrients, bringing an abundance of pelagic species (e.g. sardines, mackerel, and anchovies) which form the basis for the fish meal and oil industries. Further south, the waters are rich with demersal species (e.g. hake) and high-value crustaceans (e.g. crab and lobster).

During the 1980's there was a rapid increase in investment in boats, processing facilities, 'fish farms', etc. by large numbers of local companies and some foreign investors. Rates of return have been high in most activities, both for smaller artisanal fishing operations and larger industrial fishing-processing operations. Employment growth in the industry has been rapid (about 10%/year in the late 1980s), with total employment reaching 136,500 people in 1987 (3.4% of total employment).

The industry is predominantly export-oriented, with only 15% of landings going for domestic fishmeal use or human consumption. The industry has been a very effective exporter, able to meet strict international sanitary and quality control standards, attaining high operating and maintenance standards in processing, improving packaging, and being very responsive to changing market demand. While all segments of the industry has expanded, export growth has been especially rapid for edible fish and shellfish, with rapid gains in trade in frozen hake, surimi fish, and high-value trout and salmon. Exports of fresh and frozen fish increased in value from $47 million in 1985 to $209 million in 1989. Chile compensated for low world prices for fishmeal (a competitor with soybean meal) in the 1980s by increasing fish catches and meal export volumes. With relatively low costs and favorable

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60 Between 1980 and 1988, the number of fish processing plants increased from 172 to 506.
quality, the industry has been competitive in many markets throughout the world, although its most important outlets have been Japan, the U.S., Australia, and several West European countries.

There have, however, been several negative dimensions of Chile’s expanding fish export trade. First, the huge increase in fish landings has resulted in an over-exploitation of the resource base, threatening its technical and economic viability and putting a premium on developing aquaculture and higher value-added products. Second, there has been a significant over-investment in processing facilities, although it is not clear whether this was deliberate (in order to compensate for highly variable/seasonal fish catches) and will undermine processor profitability over the long run. Third, with a dominant export orientation, little attention was given to developing the domestic market. Fresh fish prices are not competitive with meat and chicken in urban markets and domestic fish consumption has remained stagnant at a relatively low level.

**Cultured Shrimp Production and Trade in China and Thailand**

Less than 20 years ago, almost the entire Asian output of shrimp was from capture fisheries, mostly landed by shrimp trawlers introduced by the Japanese into Southeast Asian waters in the mid-1960s. The production of shrimp in coastal or inland ponds was minimal. However, as world shrimp landings reached or exceeded maximum sustainable yields, increasing attention was given to shrimp aquaculture. While accounting for only 6% of total world shrimp production in 1980, cultured shrimp production grew to account for 26% of total production by 1990. While marine shrimp landings grew only modestly during the 1980s, world cultured shrimp production grew from about 100,000 Mt in 1980 to 690,000 Mt in 1991. The impetus to such development was very favorable world demand. Over the 1970-88 period, the annual growth rate in world shrimp consumption was estimated to be 3.7%, with significant growth occurring both within the Asian region and elsewhere. The two countries which have experienced the most rapid development of cultured shrimp production and trade in recent years are China and Thailand.

**China**

While China has a centuries-long tradition of aquaculture and has been one of the world leaders in the management of fisheries in inland lakes and reservoirs, until the 1980s, the country’s shrimp industry was based almost entirely on capture fisheries. With off-shore shrimp resources fully exploited by the 1970s, Chinese shrimp production, consumption, and trade stagnated.

During the 1980s, substantial private and public sector investment in cultured shrimp production and processing led China to become the world’s largest cultured shrimp producer and shrimp exporter. During the decade, cultured shrimp production increased from only 2600 tons to

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62 Data from Infofish, various issues.

63 Aquatic Farms Ltd. (1989).

64 This case study is based on Feng (1989), Aquatic Farms Ltd. (1989), and Wildman and Neimeier (1991).
nearly 200,000 tons, and Chinese shrimp exports increase six-fold from 21,700 tons to 122,700 tons. By 1989, the value of Chinese shrimp exports was $740 million. China's world market share for frozen shrimp increased from only 6% in 1980 to 14.2% in 1989. As Table A1 indicates, this remarkable growth was due to large increases in both the area of shrimp ponds and shrimp yields.

Table A1: Chinese Cultured Shrimp Production, Yields, and Exports

<table>
<thead>
<tr>
<th>Year</th>
<th>Area (000 Ha)</th>
<th>Production (000 Tons)</th>
<th>Average Yield (kg/ha)</th>
<th>Total Shrimp Exports* (000 Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>9.3</td>
<td>2.6</td>
<td>280</td>
<td>21.7</td>
</tr>
<tr>
<td>1982</td>
<td>16.5</td>
<td>7.1</td>
<td>270</td>
<td>14.9</td>
</tr>
<tr>
<td>1984</td>
<td>33.4</td>
<td>19.3</td>
<td>578</td>
<td>16.9</td>
</tr>
<tr>
<td>1986</td>
<td>85.1</td>
<td>82.8</td>
<td>973</td>
<td>49.3</td>
</tr>
<tr>
<td>1987</td>
<td>131.3</td>
<td>153.2</td>
<td>1167</td>
<td>73.0</td>
</tr>
<tr>
<td>1988</td>
<td>162.9</td>
<td>198.7</td>
<td>1222</td>
<td>130.7</td>
</tr>
<tr>
<td>1989</td>
<td>N.A.</td>
<td>185.9</td>
<td>N.A.</td>
<td>122.7</td>
</tr>
<tr>
<td>1990</td>
<td>N.A.</td>
<td>184.8</td>
<td>N.A.</td>
<td>136.9</td>
</tr>
</tbody>
</table>

* Includes both capture and cultured shrimp.

N.A. Data not available.

Sources: Ferdouse (1990); Infofish International (3/16/92); FAO Fisheries Commodity Statistics

China's long coastline, numerous large river deltas, and thousands of kilometers of anti-flood and saltwater intrusion dikes provides for a mixture of fresh and brackish water suitable for shrimp culture and provides an infrastructure which makes pond construction relatively inexpensive in many areas. China's enormous manpower resources, very low labor costs, and multiple forms of agricultural and fish by-products for use as feed provide additional bases for a competitive cultured shrimp industry. Due to low labor costs and the types of technologies employed, China's shrimp production and processing costs are said to be among the lowest in the world.

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65 Landings of captured shrimp stagnated during the 1980s with government measures introduced to control catches at between 30,000 and 35,000 tons per year.

66 FAO, Fisheries Commodity Statistics.

67 Based on data in FAO Fisheries Commodity Statistics.

68 In recent years, the Chinese have developed strong linkages with the Chilean fish meal industry and may have acquired some fish meal plants in that country. This expanded meal supply has contributed to a shift toward more intensive production methods and higher yields.

Set against such advantages is the cool weather and cold water temperatures in the central and northern parts of the country. For most of the country, shrimp can be cultured only for 4-5 months, allowing just one crop, and concentrating harvests over just a two-month period. This places China at a disadvantage vis-a-vis other major shrimp producing countries in Asia. It also places enormous stress on the processing and marketing infrastructure at one time of the year, increasing inventory costs and adversely affecting quality.

The primary impetus behind the industry’s development came from the Chinese government. A transition from formerly experimental production to commercial production came with the establishment of a government shrimp culture enterprise (in Lianyungang) in the late 1970s. This was followed by several support measures and economic incentives to develop aquaculture, including the provision of some $20 million in grants and development loans at low interest rates to shrimp producers and processors, the development of a very effective aquaculture research and extension system, the granting of tax exempt status (from 1979-84) to shrimp production and trade, and the development of hatcheries for the supply of seedstock. Unlike in many other areas of agriculture, shrimp growers were permitted to obtain inputs from whatever sources they wanted and shrimp exporters were allowed to retain a share of the foreign exchange earnings. While there were initially state controls on shrimp procurement and marketing, such controls were abolished in 1985, leading to a surge in domestic market activities.

A major international market opportunity was provided to China by the failure of traditional Latin American exporters to meet the growing U.S. demand in the mid-1980s and by the subsequent collapse of the Taiwanese shrimp industry due to technical problems. China is now the largest exporter of shrimp to the United States, the second largest exporter to Japan, and has recently penetrated the European market. For the most part, China has served as a low cost supplier of non-differentiated products--its exports consist almost exclusively of block frozen shrimp with sometimes uneven quality. The industry has yet to make headway in the production of higher value or customer-specialized products.

**Thailand**

By the early 1970s, the shrimp resources in the Gulf of Thailand and other areas within Thailand’s EEZ were fully exploited. Still, marine shrimp landings by Thai vessels continued to expand until the early 1980s with larger catches being made outside of Thai waters. With Thai vessels being increasingly excluded from fishing in the neighboring country waters, attention by local entrepreneurs turned to the development of shrimp aquaculture.

Thailand had favorable conditions for the development of a competitive and profitable cultured shrimp industry: substantial resources of fresh and brackish water, a location near the equator (allowing all-year production), and a large and relatively skilled labor force. A well developed agricultural sector provided many by-products which could be used as feed, although

---

70 Average yields increased from 0.4 tons/hectare in 1982 to 1.2 tons/hectare in 1987 (Wildman and Niemeier 1991, p.55).

71 In 1988, about 50% of the shrimp marketed from ponds was sold in the domestic market. As incomes and living standards improve, the domestic market should grow rapidly (Wildman and Niemeier 1991, p.56).
eventually a specialized feed industry developed. The industry benefits from a large well-established infrastructure of processing plants and cold storage units which catered to the marine fisheries industry, including captured shrimp, tuna, and other commodities. Hence, cultured shrimp were simply added to the product mix of existing processing and marketing companies. The industry could cater not only to growing international demand, but to large and rapidly growing domestic demand, both within the tourist industry and among the general population.

Sources: Ferdouse (1990); Infofish (3/92)

Initially, cultured shrimp production mostly involved extensive methods. However, with rising land costs more intensive production methods (patterned on those developed in Taiwan (China) were adopted by the mid-1980s. This, together with the adoption of a new larger-sized species, had a dramatic impact on average yields, which increased from 328 kg/Ha. in 1982 to 800 kg/Ha. in 1988. Total cultured shrimp production increased from only 3300 tons in 1975 to 10,371 tons in 1982 to 110,000 tons in 1991. With marine shrimp landings declining, this expanded cultured shrimp production has underpinned a large increase in Thailand's exports of fresh, frozen, and canned shrimp during the past decade. While fresh shrimp are largely sent to nearby countries (e.g. Malaysia, Singapore), value-added canned, frozen, and specialty products have been very competitive

---

72 Average Thai yields remained below those of China and Malaysia, yet four-times those of Indonesia and India (Aquatic Farms Ltd. 1989).

73 Data from Aquatic Farms Ltd. (1989), p.156; Infofish (3/92), and Ferdouse (1990), p.32.
in Japan, the U.S., and Western Europe. Thailand has developed the most diversified shrimp product mix and market outlets of any of the Asian shrimp-exporting countries.  

**Soybean Development in Brazil and Argentina**

The world market for oilseeds and oilseed products has expanded rapidly since the early 1960s with increased demand for low-fat vegetable oils and for feeds/feed-supplements for livestock production. Soybeans and soybean products are the most important oilseeds, accounting for one-half of total oilseed production and nearly three-fourths of world oilseed trade. Over the 1962-86 period, world imports of whole soybeans, soybean oil, and soybean meal had growth rates of 7.7%, 8.9%, and 11.5% respectively.

While world soybean production and especially trade was once dominated by the United States, over the past two decades soybean production and trade has expanded rapidly in several EEC and developing countries. The most substantial increases in production and trade have taken place in Brazil and Argentina, which in 1990 accounted for nearly 30% of total world soybean production and one-half of world trade in soybean oil and meal. Table A2 indicates the growing world market shares of these two countries, compared to those of the United States.

Table A2: Shares of World Exports for Soybeans and Soybean Products

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Soybeans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>88.8</td>
<td>93.8</td>
<td>78.5</td>
<td>77.7</td>
<td>60.8</td>
</tr>
<tr>
<td>Brazil</td>
<td>1.1</td>
<td>2.3</td>
<td>17.4</td>
<td>7.1</td>
<td>14.4</td>
</tr>
<tr>
<td>Argentina</td>
<td>0.0</td>
<td>0.0</td>
<td>0.6</td>
<td>10.7</td>
<td>11.2</td>
</tr>
<tr>
<td>Soybean Oil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>79.2</td>
<td>60.5</td>
<td>26.2</td>
<td>21.2</td>
<td>15.6</td>
</tr>
<tr>
<td>Brazil</td>
<td>0.0</td>
<td>0.2</td>
<td>25.4</td>
<td>36.2</td>
<td>22.0</td>
</tr>
<tr>
<td>Argentina</td>
<td>0.0</td>
<td>0.0</td>
<td>3.8</td>
<td>1.8</td>
<td>26.0</td>
</tr>
<tr>
<td>Soybean Meal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>70.0</td>
<td>68.4</td>
<td>41.4</td>
<td>30.9</td>
<td>18.6</td>
</tr>
<tr>
<td>Brazil</td>
<td>3.7</td>
<td>9.8</td>
<td>37.2</td>
<td>43.3</td>
<td>36.3</td>
</tr>
<tr>
<td>Argentina</td>
<td>0.0</td>
<td>0.0</td>
<td>2.2</td>
<td>3.6</td>
<td>18.2</td>
</tr>
</tbody>
</table>

Sources: U.S. Department of Agriculture, Foreign Agriculture Circulars

---

74 Among the value-added products exported include cooked and peeled shrimp, peeled tempura, peeled butterfly cut, battered and breaded shrimp, shrimp skewer, shrimp spring roll, shrimp dumplings and patties, and a Thai-style shrimp soup.


Brazil

While dating to before World War I, commercial soybean production in Brazil really first developed during the 1950s with large farmers in the State of Rio Grande du Sul double-cropping soybeans with wheat. At the time, wheat was the focus of a major import substitution program, involving price supports and subsidized infrastructure development. Wheat and soybean had complementary growing seasons, benefitted one another from an agronomic sense, and could share the costs of farm and post-harvest infrastructure. With the production of traditional vegetable oilcrops lagging behind local consumption, there was a ready market for soybean and soybean products.

Although soybean production grew steadily during the 1950s, it still covered only 171,000 hectares in 1960 (0.60% of Brazil’s arable area), was largely confined to one state, and reached only 205,000 metric tons, well below domestic vegetable oil consumption. During the 1960s and 1970s, however, the soybean subsector would undergo a boom, leading Brazil to become a major world producer and exporter of whole soybeans and particularly soybean products. By the early 1980s, the soybean subsector would be a major force in Brazil’s economy, accounting for nearly one-fifth of the planted arable area and surpassing coffee as the leading export industry. Since then, Brazil’s soybean plantings, production, and exports have continued to edge upwards, despite consistently high levels of direct and indirect taxation.

Several factors contributed to the initial boom in soybean production and trade, covering the period from the mid-1960s to the early 1970’s. First, there was technical and financial complementarity between soybeans with wheat. Soybeans fixed nitrogen which enhanced wheat production while wheat production provided residual nutrients for soybean to thrive. Capital investments could be amortized over the two crops. The huge infrastructure developed under the wheat support scheme could also (or alternatively) be used for soybeans. Second, technical and market problems within the coffee industry led to the development of a coffee eradication program which brought soybean production to other parts of the country, particularly the State of Parana. Third, soybean varieties were imported from the United States and successfully adapted through a local breeding/testing program involving U.S. collaboration. These efforts resulted in considerable increases in soybean yields during the 1960s and 1970s. Fourth, soybean growers benefitted from the large increase in subsidized agricultural credit and subsidies for fertilizers and tractors which occurred during the 1960s and 1970s. Fifth, soybean production and trade benefitted from an already well-established system of cooperative marketing in the primary areas where soybeans were grown. Sixth,

---

77 This case study is based on Soskin (1984), Williams and Thompson (1984), UNITC (1987), Brandao and Carvalho (1991), and McGarry et al. (1992).

78 The data are from Soskin (1984).

79 In later years, when soybean varieties with longer production cycles became more common, wheat and soybean became substitute crops.

80 In this regard, the International Coffee Organization, through its Diversification Fund, financed several studies and preparatory work for an Export Corridor Program which would involve agronomic research in Parana and large investments in rail and port facilities to transport soybeans and other commodities from the interior of the country. (Communication with J.A. Nicholas Wallis (World Bank))
the government's adoption of a 'crawling peg' in 1967 (which led to a slow devaluation of the Brazilian currency) and the introduction of export tax rebates provided favorable incentives for exports. Seventh, the collapse of the Peruvian anchovy catch resulted in a large substitution of soybean meal for fishmeal in animal rations. And finally, the U.S. soybean export embargo in 1973 resulted in efforts by Japanese firms to diversify their sources of supply--efforts which included direct investments in Brazil and loans to the Brazilian government to expand rail and port facilities.

Although Brazil entered into a period of macroeconomic instability in the mid-1970s and government policies with regard to agricultural pricing, taxation, and exports would undergo frequent changes, the soybean subsector continued to thrive, with production spreading to new locations (especially Mato Grosso do Sul), with the introduction of better-adapted varieties developed within Brazil, and with an annual increase in yields of 2.2% during the 1970s. Soybean production and soybean product trade levels continued to climb through to the early 1980's. With favorable domestic and international market conditions (especially during the mid-1970s), with periodic Brazilian government controls placed on the exports of whole soybeans, and with subsidized credit and other financial incentives, a huge expansion in Brazil's soybean crushing capacity took place between the mid-1970s and the early 1980s. This investment outpaced even the rapid growth in local soybean production, leading some crushers to import whole soybeans and reducing capacity utilization in the industry.

During this period, a boom was experienced in domestic consumption of soybean oil and meal, with part of the later supporting the development of the local poultry industry. Brazil increased its world market share for soybean oil and meal (Table A2 above). The industry developed a market strategy whereby 90% of export supplies are made by September (following spring harvest) so as to precede the U.S. October harvest and developed more sophisticated market information and trading arrangements, making use of futures and mercantile markets.

Soybean production and trade grew more slowly and was more variable during the 1980s than during the prior decade as a result of high rates of effective taxation, a reduction in subsidized credit, soil erosion problems in several areas, periodic drought, and increased competition from other countries, notably Argentina. However, despite direct and indirect taxation and high rates of inflation, Brazilian soybean production remained cost competitive compared to its main competitor-- the United

---

81 Average Brazilian yields have never attained the levels achieved either in the United States or Argentina, although they are higher than other major world producers. The widespread practice of double-cropping in Brazil requires a shortening of the growing season and some divergence from optimal timeliness of cultural practices (McGarry et al. 1992, p.127).

82 The exceptions were 1978 and 1979 when soybean production was adversely affected by drought.

83 Crushing capacity increased from 6.2 million metric tons in 1975 to 27.0 million metric tons in 1983.

84 A government financing program made it possible to profitability import whole soybeans and export soybean meal.
States. This, together with the industry’s large installed crushing capacity and well-developed marketing links has enabled it to grow, despite a poor macroeconomic and uncertain policy environment. As the figure below indicates, recent macroeconomic and sector policy reforms have had a noticeable positive impact on soybean production and exports.

Sources: Soskin (1984), McGarry et al. (1992)

Argentina

While soybeans were first introduced into Argentina in the 1950s, soybean production and processing did not take off until the early-to-mid-1970s following the experience in Brazil and following the development and adoption of short-cycle wheat varieties which allowed for wheat-soybean double cropping. With favorable international prices and with Argentine farmers achieving good yields, the wheat/soybean rotation became highly profitable, leading to a rapid expansion in plantings, production, and eventually, exports.

5 See McGarry et al (1992), p. 129 for comparative production cost data for 1986. Brazil’s inland transportation costs are considerably higher than those for U.S. producers. While this does not negate Brazil’s overall cost advantage, it does result in lower farmgate prices for Brazilian growers (McGarry et al. 1992, p.164).

60 This case study is based primarily on Williams and Thompson (1984); USITC (1987); and Lacroix et al. (1992).
The initial boost to soybean production occurred despite rather than as a result of government policy.\textsuperscript{87} The government which came to power in 1973 raised export taxes on cereals and oilseeds to 40-50%, destroyed the private grain trade (and imposed the Argentine Grain Board as a monopoly exporter), maintained an overvalued currency, and imposed a value-added tax on domestically marketed soybean products. Nevertheless, between 1972 and 1976, soybean production increased nine-fold from 78,000 metric tons to 695,000 metric tons. By 1979, production would increase to 3,700,000 metric tons and exports would reach 2,800,000 metric tons, placing Argentina among the leading world producers and exporters. While Argentine agriculture experienced an annual growth rate of 2.5% during the 1970s, the annual growth rate for soybean production was a very impressive 30%.

Several factors contributed to the rapid expansion and strong competitiveness of Argentine soybean production and trade. First, Argentina's extensive lands with high natural fertility and flat topography rendered land costs relatively low and reduced the need for chemical fertilizers for soybean production. Second, Argentina's farm structure consisting of mostly medium-to-large scale producers, facilitated the rapid adoption of new technologies. Third, such technologies were readily available in the forms of new soybean varieties from the U.S. (which required little adaption to Argentine conditions) and improved tractors whose use was subsidized by the Argentine government. Third, soybean production and marketing benefitted from an already well established farming and marketing infrastructure for cereals. Soybeans were initially double-cropped and marketed along with wheat, taking advantage of already developed on-farm infrastructure, an effective system of seed production and distribution, and well-developed infrastructure for grain storage and transport. Once the private sector was once again permitted to conduct grain exports from Argentina, soybean sales were facilitated by the extensive market contacts and other resources of the major international companies operating in the country.

By the late 1970s, average Argentine soybean yields approached those of the United States, the highest in the world. With such high yields and with little use of fertilizers, the costs of soybean production in Argentina were the lowest among major world producers. Despite very high domestic inflation, this production cost advantage was retained through the 1980s. This can be seen in Table A3.

<table>
<thead>
<tr>
<th></th>
<th>Argentina</th>
<th>Brazil</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable Costs</td>
<td>66</td>
<td>111</td>
<td>90</td>
</tr>
<tr>
<td>Fixed Costs</td>
<td>57</td>
<td>69</td>
<td>168</td>
</tr>
<tr>
<td>Marketing Costs</td>
<td>30</td>
<td>40</td>
<td>24</td>
</tr>
<tr>
<td>Total FOB Costs</td>
<td>153</td>
<td>220</td>
<td>282</td>
</tr>
</tbody>
</table>

Source: Ortman et al. (1986)

After a period of slow growth between 1979 and 1983, Argentine soybean production and exports accelerated once again. By the end of the 1980s, Argentine production had reached over 10

\textsuperscript{87} Williams and Thompson (1984, p.271).
million metric tons, experiencing an annual growth rate of 8.8% during the decade and a continued growth in Argentina's share of world trade in soybeans and soybean products. This growth occurred despite very high rates of inflation, generally unstable macroeconomic conditions, and high rates of direct and indirect taxation on soybean (and other cereals/oilseeds) production through much of the decade. With little further improvement in soybean yields, most of the expanded production has derived from an extension of planted areas, with soybeans displacing corn, sorghum, improved pastures, and other crops. In most years, soybean production has been much more profitable than these crops, reflecting in part the declining world markets for cereals. Soybean production, with a DRC ratio of 0.24 (over the 1981-85 period), has also had the lowest DRC ratio among major cereal and oilseed crops.

The greatest change during the 1980s was the development of a large soybean crushing capacity within the private sector and a switch from a predominance of whole soybean exports to exports of soybean meal and oil. While in 1979, only 17% of production was locally crushed, by 1986, this share had increased to 61%. This shift was in part induced by a change in government policies in 1982 which applied lower export taxes on soybean oil and meal than on whole soybeans. The shift was also a response to differential market prospects, with increased demand for soybean oil and meal coming from Eastern Europe and developing countries and with a reduction in USSR purchases of whole soybeans. The leading soybean crushers, many of whom are major multinational grain trading companies, also undertook the processing of other oilseeds so to maintain year-long operations. Unlike Brazil, there has been little domestic market development for soybean products due to consumer preference for sunflower and peanut oil and the limited development of poultry production in the face of a dominant beef industry, based on grazing on improved pastures.

Sources: Williams and Thompson (1984); Lacroix et al. (1992)

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88 See Lacroix et al. (1992).
Demand-driven Agricultural Diversification in Taiwan (China)

Over the past three decades, Taiwan’s agriculture and agro-industry has shifted from one dominated by rice production and marketing to one in which production and domestic and external trade are dominated by high-value horticultural, livestock, and fish products. This shift has been gradual, induced by changes in domestic and international consumption patterns and made feasible by improved production technology and marketing infrastructure and methods. In the face of reduced agricultural labor, rising land and labor costs, and strong international competition in traditional exports, Taiwanese producers, processors, and traders have steadily adjusted and up-grade their product lines so to retain profitability and international competitiveness.

In the domestic market, sustained income growth, urbanization, and westernization have led to a major shift in food consumption patterns away from rice and other traditional starchy foods (e.g. sweet potatoes) and toward greater protein- and vitamin-rich foods such as meats (pork, poultry, beef), fish, dairy products, and fruits and vegetables. With changing work and living patterns, there has also been a rapid increase in demand for convenience or ready-to-eat packaged foods. While changing consumption patterns have resulted in increased food imports (especially of wheat and wheat-based products), Taiwanese agriculture and agro-industry have effectively responded to market changes. The structure of Taiwanese agriculture has changed dramatically. While rice and sweet potatoes accounted for 51% of the value of agricultural production in 1960, their share was just 17% in 1988. In contrast, the share of fruit and vegetables increased from only 7% to 31%, while that of livestock products increased from 25% to 39%.

While their value has steadily increased, the share of agricultural exports in Taiwan’s total merchandise exports has declined from 71% in 1960 to less than 10% during the 1980s. Over this period, the commodity mix of Taiwan’s agricultural exports has completely changed, as Table A4 indicates. In 1960, such exports were dominated by sugar, with canned pineapples and bananas also being important. A decade later, these three items still accounted for nearly a third of agricultural exports, although Taiwan (China) would soon lose its competitiveness in the Japanese market (and later in the domestic market) for both bananas and canned pineapple. Rapidly advancing were exports of canned vegetables, especially mushrooms and asparagus. By 1980, nearly 60% of agricultural exports would be accounted for by canned vegetables and a rapidly expanding fresh/processed fish industry led by shrimp aquaculture. Taiwan (China) would soon lose its competitive position for canned mushrooms and asparagus (to China, Thailand, and others) and would

90 Huang and Coyle (1989), op cit.
91 While the average growth rate for agricultural/fish production as a whole was 2.5% over the 1962-88 period, the respective growth rates for livestock products and fish products were 6.9% and 6.8%. In 1988, both hog/pork production and fruit production exceeded the value of rice production (Hsiao 1991, op cit.)

103
experience a collapse of its shrimp industry due to problems of disease and pollution. Nevertheless, 
during the 1980s, the country experienced a boom in its exports of hogs and pork products, of other 
canned vegetables, and especially, of fish and fish products. Eel products replaced shrimp as the 
leading fish export with recent exports exceeding $450 million/year.\textsuperscript{54}

Among recent trends has been a significant rise in frozen food exports, including fish, meat, 
and vegetable products as well as prepared meals with very high value added and catered to particular 
market niches. With growing international competition in the canned foods market, the move into 
frozen and prepared foods (together with Taiwanese investments in East and Southeast Asia) 
represents a market-driven response by Taiwanese processors to remain viable. It is in this sector 
where the Taiwanese can best take advantage of their modern processing facilities, strong quality 
control, many trained technicians, and strong business ties with Japan, while compensating for rising 
labor and raw material costs.

\begin{table}[h]
\centering
\caption{The Composition of Taiwan's Agricultural Exports, 1960-89}
\label{tab:ag_exports}
\begin{tabular}{lrrrr}
\hline
\hline
Sugar & 74.4 & 45.4 & 227.9 & 27.0 \\
Canned Pineapple & 8.5 & 19.4 & 20.6 & 2.0 \\
Bananas & 6.9 & 31.1 & 25.5 & 44.8 \\
Rice & 4.3 & 0.8 & 59.9 & 17.1 \\
Hogs and Pork & 2.6 & 6.5 & 63.5 & 507.0 \\
Fresh Vegetables & 2.5 & 8.8 & 36.6 & 40.0 \\
Poultry Feathers & 1.3 & 3.5 & 34.0 & 146.2 \\
Preserved Fruit & 0.9 & 10.7 & 130.8 & 102.5 \\
Fresh Fruit & 0.6 & 10.0 & 18.0 & 46.5 \\
Fish/Fish Products & 0.4 & 22.7 & 561.2 & 1310.3 \\
Preserved Vegetables & 0.2 & 85.7 & 443.1 & 397.7 \\
& Of Which: & & & \\
Canned Mushrooms & 0.2 & 32.0 & 108.8 & 26.8 \\
Canned Asparagus & 0.0 & 33.6 & 134.5 & 14.5 \\
Other & 0.0 & 20.1 & 197.8 & 356.4 \\
Other & 19.0 & 65.6 & 255.4 & 903.5 \\
Total Agricul. Exports & 121.0 & 310.2 & 1876.5 & 3544.6 \\
\hline
\end{tabular}
\end{table}

\begin{footnotesize}
\textsuperscript{54} Far East Agriculture, January/February 1991.
\textsuperscript{55} This paragraph is based on Chen (1985), Chen (1990), Chung (1991), and Mao (1991).
\end{footnotesize}
1960s provided financial support to farmers wishing to shift out of rice production. This, together with government research and extension programs contributed to the development of shrimp and other aquaculture production. Another 1960s program provided support for hog/pork production and marketing via production credit, technical assistance, a price guarantee system, and support for cooperative marketing. Joint government and private efforts later led to the development of an efficient electronic/computer hog auction system. Cooperatives and farmer associations received subsidies for investments in marketing facilities. This, together with a government-sponsored market information system, would have an important bearing on the development of an efficient system of cooperative marketing for fruits and vegetables within the country. A government food technology institute played an important role in spreading the technologies for food canning in the 1950s and 1960s, although food processing R&D subsequently became a major activity for the processors themselves. Although direct government subsidies in the emergent food industries were generally low compared with those for rice, sugar, and other traditional crops, the government did provide a subsidy for machinery used in processing and a large subsidy on fuel for fishing vessels.

Taiwan's efficient food processing industry has featured several hundred small-to-medium-scale companies and a more limited number of larger firms. Most processors have handling many individual commodities cutting across particular sub-sectors. Hence, many vegetable canners have added pork and/or fish products to their product lines so as to increase capacity utilization and diversify sales. Experienced management, a well-developed food processing machinery industry, large numbers of trained technicians, and very close business ties with Japanese firms have contributed to the high productivity, process and product innovation, and flexibility of many such firms. Taiwan's political and macroeconomic stability has enabled such firms to adopt a long-term, market-oriented perspective. Even as agriculture's role in Taiwan's economy continues to shrink (to only 5% of GDP in 1988), that of food processing and marketing has remained important, accounting for about 12% of manufactured GDP and 11% of total employment in recent years.

Of course, Taiwan's agro-industrial experience has not been devoid of problems. Noted earlier were the technical/environmental problems experienced in the shrimp aquaculture industry which led to its eventual collapse. The development of a large hog/pork industry has resulted in severe pollution problems, whose costs, if internalized by producers and processors, might render the industry unprofitable. Rising land and labor costs have led several Taiwanese firms to take their experience and accumulated capital and to invest in food processing operations in China and in Southeast Asia where both labor and raw materials are less expensive.

96 Given the very small size of most farming units, cooperative marketing has proven to be very important in the development of local markets for pork and fruit and vegetables.

97 On Taiwan's food processing machinery industry, see Huang (1989).

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