

Final Report

Agricultural Intensification in Mozambique

Infrastructure, Policy and Institutional Framework
— *When Do Problems Signal Opportunities?* —

August 2006

Peter E. Coughlin



EconPolicy Research Group, Lda.

Rua Francisco Matange, 192

Maputo, Mozambique

Telefax: 258-21-316286

E-mail: admin@econpolicy.org

Report commissioned by the
African Food Crisis Study (Afrint)
Department of Sociology
Lund University

financed by the
Swedish International Development Agency

Contents

Introduction	1
Colonialism, Revolution, and Capitalist Reform: The Main Contours	2
Agro-Ecology	4
Infrastructure: Transport, Storage, Communication, Electricity and Markets	6
Transportation, Storage, and Commercialization of Agricultural Products, 6	
Communication, 8	
Electricity, 9	
Supply and Distribution of Inputs, 9	
<i>Seeds, 10</i>	
Importation, Production and Distribution, 11	
Regulatory Controls, 16	
<i>Agrochemicals, 18</i>	
Food Production and Technology since Independence	25
Institutions, Government Policies, and Business Environment	28
Institution Building, the Sector-wide Program for Agriculture, and Ongoing Reform, 28	
<i>The Agricultural Extension System, 30</i>	
<i>The Agricultural Research Network, 34</i>	
Land, Macroeconomic Stability, Business Environment, and Financial Services, 35	
<i>Macroeconomic Stability and Business Environment, 36</i>	
<i>Land, 37</i>	
<i>Financial Services, 39</i>	
Gender and HIV/AIDS, 40	
Geo-Political and Economic Environment	43
Tariffs and Tariff Quotas, 43	
Sanitary and Phytosanitary Measures and Technical Barriers to Trade, 52	
Regional and International Trade Liberalization and Industrial and Agricultural Development Planning, 54	
Conclusions	57
Recommendations	58
Inputs, 58	
Research and Extension Services, 59	

Credit, 59	
Production, 60	
Transportation, 60	
Physical and Institutional Infrastructure, 61	
Synchronization of Policies and Investment to Build Clusters and Value Chains, 61	
Annexes	63
References	73

Tables

1. <i>Population density and cultivated area by province, 2000-2001</i>	6
2. <i>Actual vs. potential productivity by crop</i>	10
3. <i>Percentage of communities where inputs are available in theirs or the neighbouring community</i>	13
4. <i>Financial profitability of high and low external input usage, Mozambique, 1996/97 and 1997/98</i>	24
5. <i>Mango yields and costs: International outlook</i>	25
6. <i>Annual percentage growth in production by crop, 1975 to 2002</i>	27
7. <i>Net revenue/hectare for tobacco and cotton farmers in Zambezi Valley (\$US/ha), 2005</i>	28
8. <i>District coverage for extension services in Mozambique, 2004</i>	31
9. <i>Extension worker density in Mozambique, 2004</i>	32
10. <i>Primary school enrolment and completion rates (%)</i>	40
11. <i>Percentage of farm gate prices attributable to border protection and direct subsidies by country and group, 1986–2002, evaluated at world prices</i>	49
12. <i>Environmental measures with potential trade effects on countries in eastern and southern Africa</i>	54
13. <i>Factors adversely affecting Mozambique's ability to comply with SPS measures and environmental requirements in external markets</i>	54

Annex Tables

1. <i>Production structure of the economy (%)</i>	65
3. <i>Basic characteristics of the agricultural sector, 2000-2003</i>	66
4. <i>Summary of profitability analysis for major cash crops, 2004-2005</i>	67
5. <i>Mozambique price competitiveness</i>	68
6. <i>The biggest commercial seed markets in Africa</i>	68
7. <i>Cost of importing insecticides from China to Nacala</i>	69
8. <i>Mozambique agricultural production of selected key crops, 1997-2003</i>	69
9. <i>Selected African countries' membership in regional trade agreements</i>	70
9. <i>Capital and direct costs of using two types of transport during one hour</i>	71
10. <i>EU domestic support policies: Amber, blue and green boxes</i>	72

Figures

1. <i>Precipitation in average mm per year</i>	5
2. <i>Mozambique: Cropland use intensity, 1986-88</i>	5
3. <i>Maize trade flows</i>	7
4. <i>Maize yields, Mozambique and its neighbours, 1961 to 2003</i>	11
5. <i>Evolution of seed sales by Semoc and Pannar in Mozambique</i>	16
6. <i>Fertiliser consumption per hectare of cropland, 1961-1998</i>	19
7. <i>Agricultural and total GDP real growth rates</i>	27
8. <i>Food crop output, 1996/7-2003/4</i>	27
9. <i>The most problematic factors for doing business</i>	37
10. <i>Listing of non-tariff measures by country</i>	45
11. <i>Ranking of countries according to their sugar-production-cost index (field & factory) based on numerous sources</i>	50
12. <i>Sugar production costs, average 2000-03</i>	51
13. <i>Map of Mozambique</i>	63
14. <i>Major food crops and rural poverty in Mozambique, 2003</i>	64
15. <i>Regional trade agreements in eastern and southern Africa</i>	65

Introduction

Unlike most African countries, Mozambique possesses a huge coastline, vast tracts of virgin arable land, no landless peasants, and—extreme poverty. Colonialism trained exceptionally few Africans, left an infrastructure appropriate for serving the metropolis but, in large measure, inappropriate for the economic development of an independent state. Revolutionary war and, in their last days, the flight of most Portuguese (including manufacturers, merchants, and commercial farmers) were followed nearly immediately by a civil war that systematically destroyed the rural commercial and transport networks and educational and health systems and killed or displaced millions thus aggravating the economic disruption.

Finally, with peace in 1992, began the huge tasks of returning the refugees and rehabilitating, reforming and, eventually, expanding or creating systems, all systems, both physical and human. The process has been heavily state and donor driven. Within the framework of structural adjustment, the state rapidly privatized state enterprises, withdrew from directly productive activities, and eliminated controls over prices and markets. It also guided an evolving process of investment in infrastructure and systems, including decentralization, capacity building, and progressive reform, gradually enabling the country to merit confidence and support and to attract investment, first in the richer south and, more recently, in the poorer central and northern parts of the country. Thus, growth is quick and the economic possibilities are interlinked and fast evolving.

This is the shifting dynamic that confronts farmers and defines the possibilities and limits of agricultural development as reflected in their productive and technological choices. Blessed with abundant land but squeezed between low farm-gate prices and high input costs, the majority remain subsistence farmers sell little or nothing on the market, and those who produce for sale do so mostly without the benefits *and risks* of modern inputs. Though agricultural intensification is occurring among the farmers participating in the rapidly expanding contract-farming schemes, few others use pesticides, fertilizers and hybrid seeds. And, except for fallowing, crop rotation, and improved seeds or varieties (e.g., for maize, cassava, sunflower, and sweet potatoes), even the use of pre-industrial methods of intensification is limited, e.g., composting, manuring, small-scale irrigation, use of nitrogen-fixing crops, and integration between land and animal husbandry.

The situation, however, is far from static. Roads, electricity, and communication are expanding. Competition among input suppliers is also growing; agricultural price and supply information is more readily available; and, as primary, secondary, and feeder roads are built, traders are penetrating deeper into the countryside, initially as lone buyers and later in more open competition. Despite the problems of monopsony, false measurements, and lack of information and negotiating power, the farmers are being gradually enticed by the market, especially for the production and sale of cash crops. And, though nascent and far from uniform, there are initial signs that this is affecting both the scope and intensity of their activities.

Access to international markets is also changing. With the accelerated integration of the SADC market, especially after 2006, the regional markets will become yet more accessible, unlike Europe where increasingly strict sanitary and phytosanitary controls make exports problematic unless farmers and agribusinesses in Mozambique invest substantially to ensure quality. Moreover, Europe and the United States are slow to respond to the pressures within the World Trade Organization to phase out numerous agricultural subsidies so inimical to the interests of developing countries. Overall, however, the trend is toward global trade reform and liberalization. To benefit, Mozambique must continue to make complementary investments to facilitate market access and stimulate production.

Colonialism, Revolution, and Capitalist Reform: The Main Contours

Nearly three decades of warfare—first to overturn colonial rule (1964 to 1974) and soon thereafter (1976 to 1992) against Renamo’s guerrillas, who were heavily supported initially by the Rhodesians and some Portuguese ex-colonialists and later by apartheid South Africa’s Bureau of State Security (BOSS)—emptied rural areas of peasants fleeing horrific atrocities, halted farming in most areas, slaughtered cattle and goat herds, destroyed 90% of the country’s schools and health centres and virtually the entire rural commercial network, mined roads and footpaths, killed more than a million people, and turned another 4.7 million into refugees: 1.5 million fled the country and the rest mainly became squatters in various urban centres inside Mozambique (World Bank 2005b:13).

Compounding these problems, the legacy of five centuries of Portuguese colonial rule left the country, at independence, with very, very few black Mozambicans with a university degree¹ or even a high school diploma. At the same time, 90% of the 200,000 colonialists—e.g., managers, engineers, technicians and their families—fled, sabotaging factories and, when possible, running off with their cattle, trucks and tractors. To prevent an utter collapse, some 2,000 abandoned Portuguese enterprises were nationalized and youths with but secondary or a little bit of tertiary education became the new managers in companies and government organs while the country also sought scholarships to send thousands of Mozambicans for high school training and, initially, only a few hundred for university courses.

Attempting to implement socialist planning, the state incurred massive debts and channelled most funds toward the creation of large, capital-intensive factories and centralized state farms, including the purchase of 3,000 tractors and 300 combines (Tesfai 1991 cited by Howard et al. 1998:6). Between 1978 and 1982, only 10% of agricultural investment focused on the needs of small farmers; 90% went to state farms to buy equipment, fertilizers and pesticides.

Four key programs, which were further detailed in the 10-year Indicative Perspective Plan, *Plano Prospectivo Indicativo*, launched in December of 1981, made up the core of the longer-term development strategy. This strategy comprised creation and development of heavy industry, development of a state agricultural sector, cooperative transformation of the countryside, and massive human resource development. ... Annual GDP growth rates of no less than 17% and a fivefold increase in agricultural production by 1990 were hoped for. Accordingly, the investment component of the plan was formidable, and a series of projects that were highly capital-intensive were pursued, including plants to produce iron and steel, aluminium, chemicals, fertilizers, paper, and heavy engineering goods (Tarp et al. 2002:22).

Lacking skilled managers and artisans and the necessary complementary service industries, the strategy failed, spurring shortages, inflation, and increasing rebellion by the peasants abetted by the apartheid regimes’ efforts to destabilize the country and undermine its support for the South African National Congress. The growing civil war also disrupted transportation throughout the country and “the marketing system, which had started to regain momentum during 1977 to 1981, was again seriously affected. Hence, the number of traders, estimated at about 6,000 at independence, continued to drop to fewer than 2,000 in 1990” (Tarp et al. 2002:25).

To avoid completely losing control of the economy, Frelimo changed direction at its Fourth Congress in April 1983. Recognizing the problems of inflation, the failing “giantism” of state farms, inefficient planning and resource allocation, and insufficient investments to assist peasant farmers,

¹ At independence, approximately 40 Mozambicans had any university training at all (FAO 1982 cited by Tarp 2002:20).

Frelimo called for a reordering of priorities and the preparation of an economic action program for the 1984–86 period. Mozambique committed itself to initiating a set of reforms, including greater economic flexibility and decentralization as well as reliance on market forces. The country put renewed emphasis on the importance of the smallholder sector. Private initiative was to be promoted in all sectors of the economy, and reforms were instituted in labour legislation and in the regulation of foreign investment (Tarp et al. 2002:24).

Nevertheless, the state-planning mechanisms remained mostly intact, the economy continued to slip, and the hostilities intensified. In 1984, Mozambique joined the World Bank Group and, hoping to undermine support for Renamo, Pres. Machel signed the Nkomati Accord with South Africa though, in fact, the latter virtually ignored the agreement. Support for Renamo continued unabated and South Africa's intelligence forces assassinated Machel, downing his plane in 1985.

With a deteriorating economic and military situation, in 1987 the government—at the behest of the World Bank—instituted the Economic Rehabilitation Program, designed to move toward a market economy. Renamed the Economic and Social Rehabilitation Program in 1989, the programme contained measures to stabilize the economy by devaluing the currency and restraining governmental expenditures and, eventually, to liberalize the economy by privatising state owned enterprises, removing price and product-movement controls,² improving, over time, the legal and administrative framework for economic activities and, in general, encouraging domestic and foreign private investment. For example, “while products with fixed prices accounted for about 70% of GDP in 1986, this proportion had fallen to about 30% by 1989” and restrictions on the movement of agricultural products were lifted in 1990 (Tarp et al. 2002:27 and Santos et al. 2002:2). Though the civil war raged on and “the stabilisation policies were slow to achieve the intended changes,... they did boost growth to the real annual rate of 4% per capita in the period 1986-92.... The growth was achieved by encouraging small-scale, urban, and non-tradable activities and through increasing aid as a share of GDP from 8.7% in 1986 to 118.2% in 1992” (Brück, Fitzgerald and Grigsby 2000:9).³ The war, however, continued to ravish the countryside. With blown-out bridges, mined or ruined primary and secondary roads, few feeder roads, and a largely destroyed agricultural commercial network, most of the farmers who had not yet fled planted crops merely for their own consumption, not the market.

Peace—at first tenuous and then gradually solidified—came with the Rome Accords in October 1992 and, with that, large programs began to de-mine the countryside, resettle refugees, rebuild the devastated infrastructure, reconstitute herds, revive or expand agricultural research and extension services, privatise hundreds of moribund state enterprises, and attract new investors. Now for more than a decade, two additional structural adjustment programs (1990 to 1994 and 1995 to 2000) and other efforts have been ongoing, progressively moving from reconstruction and rehabilitation to attacking problems of growth, agriculture and human development in numerous spheres ranging from investments in infrastructure, research, education and agricultural extension services to the reform and simplification of legal, administrative and tax⁴ systems (World Bank 2004).

² “Legally binding fixed producer prices were changed to ‘reference prices’ in the early 1990s, with no legal requirement to pay them. Since 1996, not even these reference prices have been announced” (Jayne 1999:17).

³ Liberalization also spurred hyperinflation. “An index of the prices of such goods (including maize, cooking oil, sugar, beans, soap and salt) increased from 100 in 1986 to 1,667 in 1989 while the consumer price index for the same period increased from 100 to only 562” (Brück, Fitzgerald and Grigsby 2000:10).

⁴ In the late 1990s, the country shifted from a compounding sales tax to a value-added tax and “import tariffs were steadily lowered to the point where the average tariff is 9%, one of the lowest in Africa. The plan is to reduce the top tariff rate to 20% in 2006” Presently, “tariffs on capital goods and intermediates are between 5.0% or 7.5%, and those on raw materials are 2.5%” (World Bank 2005a:xii, 59).

The results have been dramatic. “The poverty headcount fell from 69% in 1996/7 to 54% in 2002/3 though the United Nations Development Program’s *Human Development Report 2005* still ranked Mozambique 168th out of 177 countries on the human development index (UNDP 2005:222). Nevertheless, on average, the economy grew by 8% annually between 1996 and 2003”, 7.2% in 2004, and a projected 7.7% in 2005. Indeed, per capita income grew from \$120 in the mid 1980s to \$276 in 2004. These results are the fruit of economic stabilization and reforms, reasonable macroeconomic stability, huge donor inflows amounting to half the government budget,⁵ the agricultural “catch-up” after the Peace Accord plus an expansion of agricultural exports (mostly tobacco, sugar, cotton and cashew nuts) and the attraction of mega-projects in gas, aluminium, and heavy sands (World Bank 2005a:xi, 19 and 135).

Despite these advances, by 2005 (13 years after the Peace Accord), most farmers—often returned refugees—still have no cattle for milk, meat, haulage or ploughing, and many, as our survey revealed, have no livestock, not even a chicken.⁶ The farmers’ isolation and the cost of overcoming it are big problems inhibiting agricultural intensification and, where existing, rural markets for inputs and crops are often weak, non-competitive and inefficient (Kyle 2003:3). In 2000, with only 27% of the population living in urban centres⁷ and much of that concentrated in the south around Maputo (UN 2005), the effective demand for farm produce is weak, especially in the fertile and food surplus northern and central provinces, and many farmers still have little option but to plant for mere subsistence. Moreover, for historical reasons, the country—though vast—has less than 500, mostly small or medium-sized commercial farmers.

Agro-Ecology

Rare for a sub-Saharan country, Mozambique has vast tracts of unused forests and cultivatable land, with most regions getting more than 800 mm annual rainfall and few being semi-arid (Annex Table 2). Seventy-eight percent (62 million hectares) has forest vegetation;⁸ 46% is cultivatable; and roughly 10% is actually cultivated, and 97% of that by smallholders (Issufo 2003:1; World Bank 1996 and 2003; MADER 2003a:14). Theoretically, that is 12 to 13 hectares for each farm family as opposed to the actual average, 1.4 ha (Table 1 and Annex Table 2) (World Bank 2005a:17).

“Mean annual rainfall is around 800 mm to 1,000 mm along the coast, around 1,200 mm in the mid-part of the country, and between 1,000 mm and 2,000 mm in the north. There is considerable variation: even within the wetter north there are areas of low rainfall” (World Bank 2005a:76) (Annex Table 2). Irrigation covers merely 3% of the potential (World Bank 2005b:9). Of Mozambique’s 138 districts, 20 are “highly prone to drought”; 30, to flooding; and another 7, to both risks (Rohrbach et al. 2001:39). Overall, 48.2% of the population suffers one, the other, or both risks. For example, in 2001, 3% of agricultural land was flooded, necessitating massive relief operations and, in 2005, the south and some other parts of the country endured prolonged droughts.

Having Mozambique’s best agricultural land, the north and centre usually export food crops while the more arid south imports. Given the length of the country and the inadequacy of the

⁵ “Between 1997 and 2003, Mozambique’s foreign aid receipts were ... 12% to 19% of GDP, or \$500 million to \$700 million, including both programme and project assistance. Mozambique is one of the continent’s largest recipients of aid, garnering \$58 per inhabitant, more than double the sub-Saharan African average of \$26” (World Bank 2005b:24).

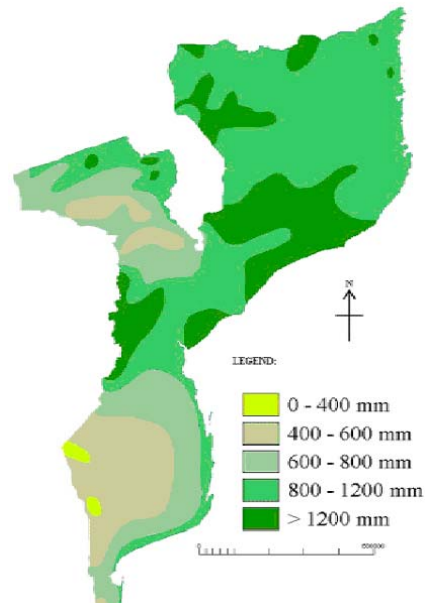
⁶ In a 1994 survey, only 8% of farmers used animal traction, whether owned, hired or borrowed, 5% used tractors, and the rest, human power (Toro and Nhantumbo 1999:259). In 2003, only 61% of farm households had chickens (Perumalpillai-Essex 2005:14).

⁷ up from 6% in 1976 and 26% in 1995

⁸ including 19 million hectares classified as “valuable for timber production” (Issufo 2003:5)

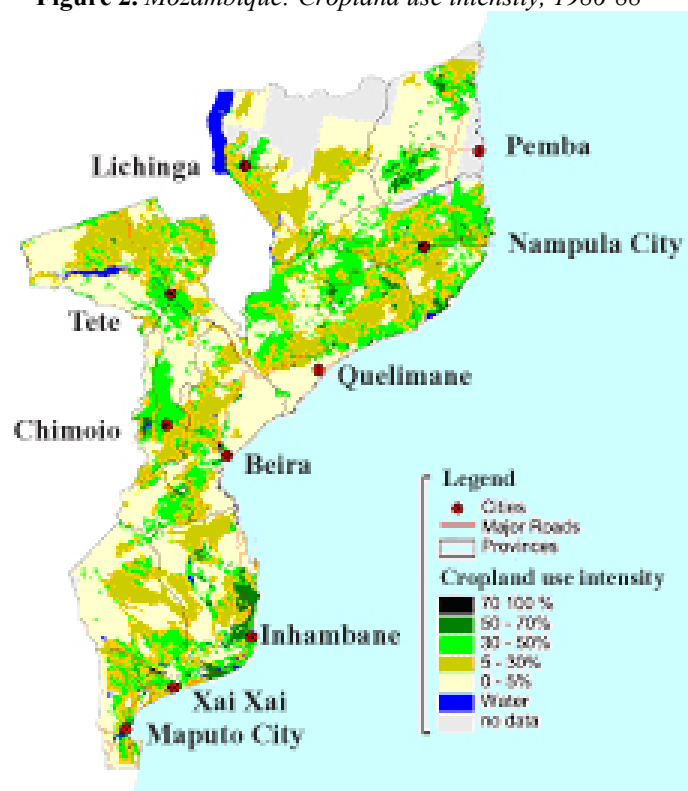
transportation network, the north exports crops within that region but little to Maputo in the south, which imports food from South Africa and Mozambique's central provinces (Jayne 1999:17).

Figure 1. *Precipitation in average mm per year*



Source: INIA-DIA (1999)

Figure 2. *Mozambique: Cropland use intensity, 1986-88*



Source: www.iiasa.ac.at/research/pop/pde/maps/mz/b-mzcropland.gif

Note: Though old, this map gives a fair view of the vastness of the idle lands available in Mozambique.

Table 1. Population density and cultivated area by province, 2000-2001

Province	Population density (pop./km ²)	Cultivated area (%)
Niassa	6.2	1.9
Cabo Delgado	16.4	4.8
Nampula	37.8	9.4
Zambézia	28.1	5.3
Tete	11.3	3.9
Manica	15.6	4.9
Sofala	19.1	4.1
Inhambane	16.4	6.0
Gaza	14.0	6.1
Maputo Province	35.6	5.1
All Mozambique		4.9

Source: CAP 1999-2000

Infrastructure: Transport, Storage, Communication, Electricity and Markets

Devastated by war or lack of maintenance and the destruction of its network of rural traders, Mozambique's physical and commercial infrastructure—transportation, storage, communication, electricity and markets—has needed major rehabilitation and expansion to cope with the needs of an expanding population and the possibilities and exigencies of an independent economy.

Transportation, Storage, and Commercialization of Agricultural Products

Under the Portuguese colonial government, roads and railways were mainly laid to facilitate the exportation of agricultural produce from inland including from Malawi, Zambia and Zimbabwe. North-south trade was minimal. Even today, no north-south rail system exists and, though improving, the national road network is still one of the least developed in southern Africa (Figure 13). This greatly impedes north-south trade within the country. For example,

It costs nearly \$7,000 to truck a 22 to 24 tonne container from Maputo to Pemba, which is nearly 2.5 times the amount it would take to ship the same container from Dubai (\$2,550) or Guangzhou, China (\$2,550). Given the infrequent service routes and poor quality of shipping service, shipping cargo from Nacala to Maputo costs \$2,500, which is nearly three times the cost of shipping a container from Maputo to Dar-es-Salam, Tanzania (\$845), and approximately the same cost as shipping a container from Dubai or Guangzhou to Maputo.” (Global Development Solutions 2005:50-51).

Nevertheless, between 1992 and 2000, roads in good or fair condition rose from 10% to 57% of the classified network [and, by 2003, to 70%],... impassable roads decreased from 50% to only 8%,... [and] unpaved roads in good to fair condition rose from 20% to 51%.⁹ “The density of the road network is the lowest in Southern Africa (32 km per square km)” (World Bank 2005b:

⁹ Till recently, the main though not exclusive emphasis by the Ministry of Transport has been on rehabilitating and maintaining the primary and secondary national roads. Tertiary and feeder roads have received far less funding though the emphasis is shifting, especially with the efforts programmed under ProAgri II and other government programs to decentralize and allow more expenditures and power of decision by provinces and districts. Still, despite the obstacles, “over 7,900 km of feeder roads were opened between 1992 and 2002, contributing to resettlement of a large number of people who had been displaced by the war, and the revival of large areas of previously abandoned land” (ILO/EIP 2005).

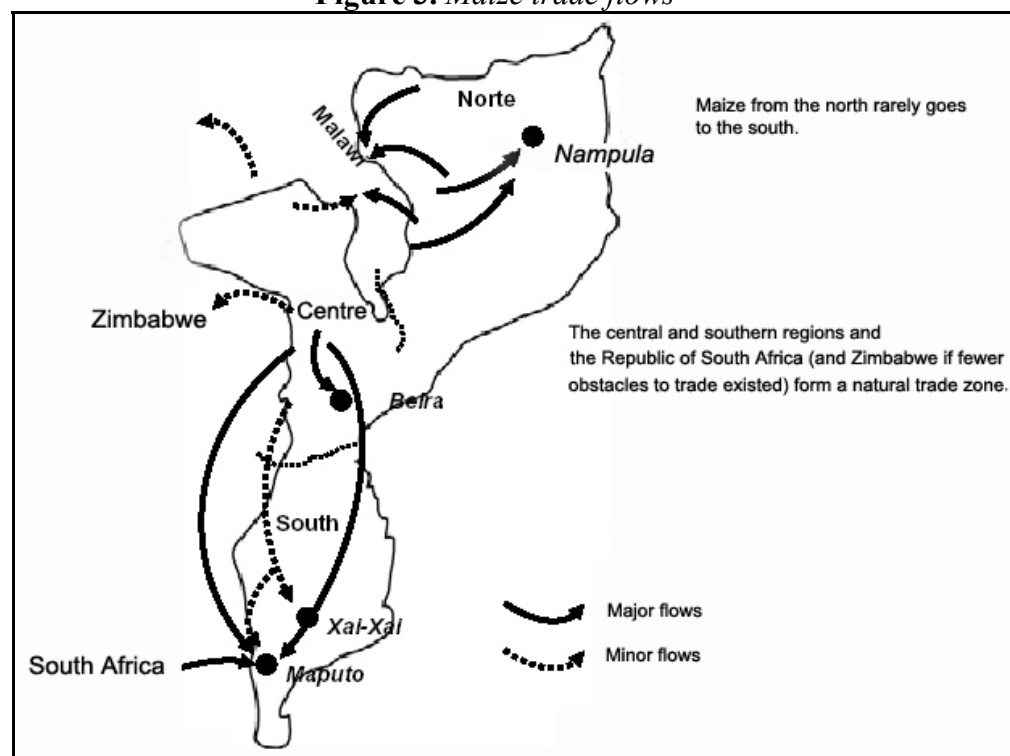
viii). The sparseness and inadequacy of roads make many farmers distant from markets or ambulant traders and, in part, explains why two-thirds of farmers sell no crops and only 10% sell their surpluses of maize, cassava or cotton (World Bank 2005b:5 and 54). Nevertheless, due to the improvements, transport costs are beginning to decline stimulating a modest increase in north-south trade and “a tendency for prices to converge across sub-regions” (World Bank 2005a: xvi and 19-20).

Coastal shipping is also deficient and irregular and no shipping service exists directly from Maputo to Durban.

Only one service, Mozline, [has] ships [that] depart Maputo and call at the northern ports of Beira, Nacala, Dar-es-Salaam, and Mombasa. The ships then return from Mombasa to Nacala [and] Beira and proceed directly to Durban. The reason for this is that Maputo rarely has sufficient inducement cargo to attract vessels on their return voyage (inducement volumes for Maputo start with at least 20 full container loads (FCLs)). The voyage from Maputo to Mombasa and back to Durban takes 14 to 16 days. The only other service is a feeder service for Mozline and [it calls] at Quelimane and Pemba as well. Hence, the export service to South Africa from Beira, Quelimane and Nacala is workable and economically viable. Exports from Maputo and surrounding areas to South Africa are better served by road or rail transport through the Maputo corridor (External Market Task Force 2004:18-19).

As a result of the road, rail and maritime impediments and costs between the northern and southern sections of the country, agricultural produce mainly circulates within and not between those zones (Figure 3).

Figure 3. Maize trade flows



Source: adapted and translated from Abdulha and Arlindo (2002)

Due to transport costs compounded, in many zones, by lack of competition, the commercial margins for agricultural products are, by regional standards, quite high, especially for primary agriculture, e.g., grain, 27.4%; cassava, 302.5%; raw cashew, 44.2%; other export crops, 52.3%; and basic food crops, 111.2% (Arndt et al. 1999:1). “The Social Accounting Matrix data show

that marketing margins for some sectors are as high as three times the producer price in 1995, and they are especially large for primary agricultural production. These marketing costs represent wedges between producer and purchaser prices, and partly explain why more than half of agricultural production remains non-marketed” (Annex Table 1) (Arndt et al. 1999:7). According to one simulation, “a 15% reduction in marketing margins” would stimulate production and sales and lead to “a 4.9% increase in welfare” (Tarp et al. 2002:105).

Despite the high cost of transportation, certain crops are demonstrably lucrative especially into South Africa, Malawi, Zambia and Zimbabwe (Annex Table 3 and Annex Table 4) (World Bank 2005b:119; External Market Task Force 2004:23). And, with the ongoing high rate¹⁰ of investment in construction and rehabilitation for rural and district roads, the competitiveness of Mozambican crops should improve.

As for storage, the Instituto de Cereais de Moçambique has 160,000 tonnes of storage space inherited in 1995 from the state marketing organization, Agricom, some of which it uses, especially to facilitate its purchases and exportation of maize, and the rest it rents out. For most of the merchants monitored by SIMA, storage is simple because the turnover is fast: usually less than a week “except for sporadic needs when storage lasts up to a month” (Abdula 2001:6) Given the smallholder and subsistence basis of agriculture in Mozambique, most storage occurs in traditional silos that, without pesticides, are subject to big losses. But those who can store products safely usually make big profits by waiting just a few months till prices climb.¹¹

Communication

Radio and telecommunications have also improved greatly. Since 1991, the Ministry of Agriculture¹² has been running the Information System for Agricultural Markets (SIMA), which publicizes data about retail, wholesale and producer prices for 28 food products in 21 localities throughout the country so that farmers and merchants can know the prices available in nearby markets. The program distributes *Quente Quente*, weekly and monthly bulletins, in both print and electronic form to its numerous, diverse users and divulges the information by radio in Manica and Nampula provinces (Santos et al. 2002:1, 5 and 12). Printed media is good for NGOs, extension workers, and most merchants but useless for many farmers since 42.6% are illiterate and another 38.9% have three or less years of education. Countrywide, “only about 47% of households have access to regular price information” (World Bank 2005b:14 and 95).¹³ Nevertheless, the SIMA does help to empower farmers, especially if organized in associations, to earn more by bargaining with traders,¹⁴ and enables the latter to fulfil their role as arbitragers levelling regional prices. However, an evaluation of the program revealed that merchants and processors also need to know not just the prices but also the locations, quantities and quality of

¹⁰ 24% of total spending between 1992 and 2002 (World Bank 2005b:45)

¹¹ “During 1996/97, storing maize for several months instead of selling immediately after harvest dramatically increased farmer[s] gains although this may not be true every year. When farmers sold in June, only 36% made a profit. At the December price, 80% profited. Of those selling midway between July and December, 62% profited” (Howard et al. 1998:viii).

¹² previously the Ministry of Agriculture and Rural Development

¹³ This statistic is either an overestimate or represents a big improvement in the communication of price information to farmers in the last five years. For example, in 2000, 82% of farmers in Nampula province reportedly did not know the price of cotton till the moment they sold it (DAP 2001:7)

¹⁴ An analysis of the 2002 agricultural survey (TIA) revealed that “households ... [that] received price information realized an 11% income advantage over those ... [that] did not receive such information.” Moreover, though “only about one household in 30 belonged to an organization, usually a farmer’s association, ... one household in three said ... they received information on agricultural prices. At the community level, about one-third of the focus groups in the villages stated ... they had access to information on agricultural extension and on commodity prices.” (Walker et al. 2004: vii and 17).

available crops and the contacts of associations or others ready to sell (Equipe Técnica do SIMA 2001; Santos et al. 2002:19).

The liberalization of telecommunications and the advent of the cell phone have spawned a huge growth and flow of information.

As of 2000, there were 85,000 landlines and 51,000 cell phones. Telephone charges were high and the quality of the cell phones was poor. The government created an independent regulatory body, revised the sector law, and attracted a new mobile operator. By 2005, there were 800,000 mobile phone subscribers, many of them outside of Maputo, and the quality of service has improved substantially (World Bank 2005a:20).

According to the national target, all district capitals should have cell-phone service by the end of 2005, and many traders use this for calls and Internet access to inform basic buying and selling decisions for the local and international markets.¹⁵ Nationally, 10% of the population—mainly in the cities—has access to telephone services (World Bank 2005b:46). Curiously, on certain hills or high points (e.g., trees and rooftops), cellular calls can be also made in some rural areas. In rare cases, export-oriented rural traders even use cell phones to gain access to the Internet though this is extremely expensive. All provincial capitals and some district capitals now have Internet access.¹⁶

Electricity

The lack or inadequacy of electricity is:

the most serious infrastru[ctur]al problem for the Mozambican manufacturing sector, with nearly 64% of firms ranking it as a major or severe problem. Power outages and oscillation of the voltage has led to the loss of equipment. As capacity utilization increases, and firms begin to engage in continuous production, an erratic power supply will become an ever-increasing constraint. The Investment Climate Assessment reported that firms suffered 17.5 power outages per month, or on 193 days in the year, well above the nine African countries surveyed whose average was 77 days. Outside Maputo it is more acute: in the centre and the north, average monthly power outages were 30 and 29, respectively. A study of cotton ginneries found that power outages reduced the 81-day season by five days and forced ginneries to install generators, whence the cost of electricity is \$0.085/Kwh, as opposed to \$0.035/Kwh on the grid (World Bank 2005a:54)

Many district capitals are not served by the national power grid, and any electricity they have comes from expensive, intermittent and unreliable generators. Electricidade de Moçambique EP plans to extend the national grid to all district capitals by 2010 (*Agência de Informação de Moçambique* 19/12/05). This impedes the development of agro-industries and, hence, the growth of demand for agricultural produce.

Supply and Distribution of Inputs

Besides being squeezed by low farm-gate prices,¹⁷ farmers also confront high prices for improved inputs—seeds, fertilizers and pesticides—capable of raising productivity by 67% to

¹⁵ Nevertheless, the Ministry of Finance refuses to rebate the value-added tax on cell-phone charges since it classifies cell phones as a luxury item instead of realizing that they are an essential business tool especially for traders in outlying districts with no other form of fast communication.

¹⁶ interview with Salomão Manhiça, Director, Gabinete da Política Informática, Governo de Moçambique, 27/12/05.

¹⁷ For example, the World Bank (2005a:114) found that “farm-gate prices of cotton are amongst the lowest in southern Africa due to lobbying by some of the joint venture companies”.

576% (Table 2). Even access to such inputs, though free of import duties, is difficult and extremely limited except within the contract farming schemes (Howard et al. 1998:vi). Moreover, due to the low farm-gate prices for crops, the application of expensive modern inputs is risky and not always lucrative, especially for small farmers.

Table 2. *Actual vs. potential productivity by crop*

Crop	Actual productivity (t/ha)	Potential productivity (t/ha)	Average increase in productivity (%)
Cassava	4.0 to 5.0	5.0 to 10.0	67
Cotton	0.3 to 0.6	1.2	166
Sorghum	0.3 to 0.6	0.8 to 2.0	211
Beans	0.3 to 0.6	0.5 to 2.5	233
Rice	0.5 to 1.8	2.5 to 6.0	270
Maize	0.4 to 1.3	5.0 to 6.5	576

Source: MAP (1997) and World Bank (1996) cited by Howard et al. (1998:vi)

Seeds

Of farm households, 82% complain that the poor or costly supply of seeds is their main agricultural problem (Annex Table 2). Only “5% to 10% of all seed used by Mozambican smallholders comes from improved varieties”; most use seeds selected from previous harvests (Libombo and Uaiene 1999 cited by Howard et al. 2001:6). In the early 1990s, though per-tonne seed prices were “*comparable or lower* than those in neighbouring countries”, seed was “expensive for Mozambican farmers relative to the output prices they receive[d]. The average ratio of OPV seed¹⁸ to grain price” was “4.5 in sub-Saharan Africa and 5.4 in southern Africa, compared to 7.1 in Mozambique” (CIMMYT 1994 cited by Howard et al. 1998: xi). Seemingly, by the late 1990s, per tonne seed prices rose.¹⁹

Based on official company price lists, the recommended retail prices for the same varieties of maize, sorghum, cowpea and sugar beans are 18% to 48% higher in Mozambique than in Zimbabwe. Only the prices of groundnut (principally imported from South Africa) were lower in Mozambique than in Zimbabwe. Higher seed prices in part reflect the higher costs of transport and distribution in Mozambique. But these may also reflect the monopoly position of Semoc in the national market (Rohrbach et al. 2001:14).

The high cost and low usage rates have historical roots and are linked to costly and monopolistic distribution systems, extreme dependence on imports (including donor aid), scant domestic research and production of seeds, and an inappropriate regulatory regime.

The results are dire.

Mozambique is one of ... many countries under-investing in its national seed system. Rough estimates ... indicate the country is losing at least \$260 million per year in agricultural incomes. This is a simple measure of the reduced levels of productivity resulting from the

¹⁸ open pollinated varieties

¹⁹ Without direct access to the CIMMYT (1994) report, I was unable to verify the details concerning the relative movements in seed prices within the region during the 1990s. Assuming, however, that the overall observations noted above are correct, an obvious question is why did seed prices in Mozambique increase more than elsewhere in the region. Did privatization cut subsidies while simultaneously giving the new private owners both motive and a free hand to exploit their monopoly? On this, the literature seems silent.

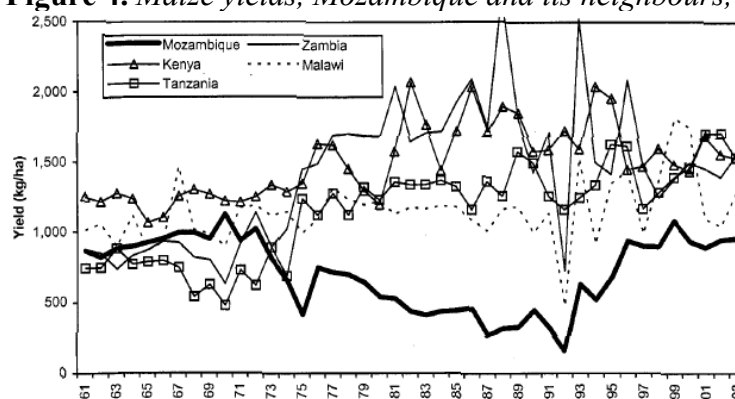
failure to disseminate varieties of key crops that have been developed or tested by the national research service, and found to offer higher yields. Many of these varieties are simply not reaching the majority of Mozambique's farmers (Rohrbach et al. 2001:1).

Rough estimates suggest Mozambique is annually losing up to \$77 million in productivity gains from the failure of the national seed system to disseminate known grain and legume seed currently identified on the national variety registration list. In addition, the country is losing \$185 million as a result of the limited distribution of improved manioc and sweet-potato planting material. Substantially larger sums are being lost if one considers the complementary costs of continuing food insecurity and poverty. The direct costs of the limited distribution of new varieties translate into an annual average **loss of \$97 ... for each farming household** in the country. This is equivalent to one-half ... of [the] average per capita income (Rohrbach et al. 2001:3, emphasis added).

Notable successes, however, have also occurred. The distribution of drought-resistant maize and high-yield cassava, sunflower, and orange-fleshed sweet potatoes have had a palpable impact on productivity. By 1999, for example, maize yields had climbed from "160 kg/ha in 1992 to over 1,000 kg/ha" (Figure 4) and, by 2002, 34% of farmers purchased drought-resistant maize seeds (World Bank 2005b:18). "NGOs [also] acquired and multiplied basic seed for Black Record (BR), an improved open-pollinated sunflower variety which had performed well in UEM/INIA trials. BR has a higher oil content (35% to 42%), higher yields (400 kg/ha to 700 kg/ha under smallholder rain-fed conditions and, with fertilizer and irrigation, up to 2,000 kg/ha) and is easier to crush than colonial-era varieties" (Howard et al. 2001:38). By 2002, 34% of smallholders purchased improved seed (Loening and Perumalpillai-Essex 2005:vi). Nevertheless, few other improved seeds or stocks have been widely distributed or accepted.

The lesson, however, is that, once developed, disease resistant improved varieties appropriate for low-input agriculture are readily accepted by small farmers. This is especially so for self-propagating or open-pollinated varieties whose stock or seeds are eagerly passed neighbour to neighbour and village to village. Indeed, during the last decade, improved low-input varieties (e.g., cassava, sunflowers, and sweet potatoes) have been responsible for many of Mozambique's biggest successes in agricultural intensification.

Figure 4. *Maize yields, Mozambique and its neighbours, 1961 to 2003*



Source: World Bank (2005b:111)

Importation, Production and Distribution

The problems and present structure of importation, production, and distribution of seed throughout the country reflect strongly the difficulties the country encountered during the civil

war (between 1976 and 1992) and the initial years after the Peace Accords in 1992. In the late 1970s, the government started

the National Seed Programme with assistance from FAO and the Scandinavian donors ... to support the development of basic seed by INIA²⁰ and seed multiplication” at three regional centres. Though fully functional by 1980, the programme “was unable to supply all the country’s seed requirements ... and, between 1982 and 1986, the marketing agency, Agricom, recirculated 2,000 to 5,000 metric tonnes of grain per year as seed to smallholders and private farmers as the war disrupted traditional seed preservation systems (Howard et al. 1998:18 citing also Tesfai 1991 and Strachan 1994).

To coordinate seed production, the government created a parastatal, the Empresa Nacional de Sementes (ENS), and, in 1982, a national seed service within INIA to test and control seed quality. In 1989, ENS “was transformed into a semi-commercial seed company, Sementes de Moçambique Limitada (Semoc)”, which, in many areas of the country, is still the main *commercial* producer and distributor of seeds. “The new company produced seed for rice, maize, groundnut, bean, cowpea, soybean, sorghum, sunflower and some vegetables, while cotton seed production remained the responsibility of the state. Production took place initially on centralized seed farms and, beginning in the early 1990s, with contracted seed producers.” Semoc focused mostly on open-pollinated varieties instead of hybrids since the latter were deemed to be beyond the financial means for most farmers (Howard et al. 1998:18).

Due at first to emergency programmes and later to the resettlement efforts, “formal seed production (excluding cotton) increased rapidly from 2,000 tons in 1988 and peaked at almost 9,000 tons in 1994. “By the mid 1990s, domestically produced seed constituted 60% of Semoc’s total sales with the remainder imported,” and maize seed comprised 70% of the company’s total seed production and 64% of its total sales. In the early 1990s, emergency seed constituted 90% of Semoc’s business. Moreover, since these seeds were distributed by NGOs and the Provincial Agricultural Directorates, “the commercial infrastructure for the distribution of seeds was almost non-existent by the mid-1990s”. The residual was sold through Semoc’s own shop in Maputo and through Boror Commercial (Howard et al. 1998:18).

When the donor programmes began to dwindle off in the mid 1990s, national seed production plummeted “to just over 5,000 tons in 1995, far below the installed processing capacity of 18,000 tons/year”. When this happened, the lack of an extensive commercial network greatly complicated Semoc’s transition to a fully commercial organization independent of aid donors and able to reach the farmers and respond to their needs.²¹ Largely due to this “long history of free seed supply given as humanitarian relief efforts following droughts and floods, ... 37% of [Mozambique’s] 128 administrative districts ... [had] no retail seed store at all in the early 2000s” (World Bank 2005b:64). Another 34% had only one seed store thus leaving farmers vulnerable to monopolistic abuses (Rohrbach et al. 2001: Table 7). Lower down, most communities have no retail outlets for seeds or agrochemicals (Table 3).

²⁰ the National Institute for Agricultural Research

²¹ Partly to facilitate the development of this network, the government—using 16 NGOs under contract—organized 104 input trade fairs in 2003 and 2004 based on purchase vouchers (instead of input and tool kits) distributed used by 51,670 female-headed households and other very poor farmers in 56 drought-affected districts in southern and central Mozambique (FAO 2004). Problems arose, however, concerning the fairness of the distribution of the vouchers and the long-term impact of input fairs primarily focused on emergency relief, as a way to strengthen local commercial networks.

Table 3. *Percentage of communities where inputs are available in theirs or the neighbouring community*

	Tools	Chemicals*	Seeds
Niassa	17	11	26
Cabo Delgado	16	6	17
Nampula	16	3	20
Zambézia	10	1	13
Tete	3	6	14
Manica	22	18	27
Sofala	26	12	35
Inhambane	23	16	48
Gaza	9	2	5
Maputo	14	11	9
Weighted average	14	6	20

Source: TIA (2002) cited by Perumalpillai-Essex (2005:16)

* Chemicals = fertilizers and pesticides

Starting in the late 1990s, however, competition increased. “In 1998, SeedCo, a Zimbabwean firm, purchased ... majority ownership of Semoc” and has been setting up more retail outlets and local seed production with the help of NGOs while also trying to stimulate demand. A new entrant, Pannar Ltd.,²² began in 2000 to sell imported seeds in the south and, in 2001, expanded into central and northern Mozambique. In the north, it began to contract NGOs to organize farmers to grow seed (Massingue 2004:8; Donovan 2003:34-35).²³ At about the same time, “Tecap, a Mozambican firm, ... became an agent for MayFord, a South African seed firm” (Howard et al. 2001:7). The additional competition was healthy: by 2002, Pannar was already selling *twice* as much as Semoc, and “with the appearance of this new company, ... the seeds’ quality (germinative power) improved despite isolated complaints” (Massingue et al. 2004:8). (Figure 5). Moreover, during the 2001/2002 campaign, both Pannar and Semoc stopped working directly with seed retailers and, instead, began to promote sales through a vigorous network of wholesale agents. In 2003, the Advanced Seed Co.²⁴ became registered in Manica. It adopted a new strategy by selling seed on credit, especially to farmers’ associations, and, in exchange, the farmers must agree to sell their crops to the company (Massingue 2004:15 and 17). The seed companies and other input suppliers are also reducing distribution costs and technical assistance expenditures by dealing increasingly with farmers’ associations and NGOs instead of individual farmers. For example,

associations participating in cotton outgrower programs now carry out input distribution, application, and extension functions formerly managed by company employees, at an estimated salary savings of five million meticaís/year for each 300 hectares moved to association management. Output marketing costs are also reduced by an estimated 60% since associations have assumed many collection, weighing, grading and marketing functions.

²² Companhia Privada de Sementes, Lda., with the support of Pannar-South Africa, Ltd.

²³ On a far lesser scale, other companies such as V&M, Agro Alfa, AgroFocus, and Agrotech distribute imported and locally produced seed. Various NGOs organise the production and distribution of grain, e.g., World Vision International (WVI), Agaka, Oxfam, Care International, Save the Children, Promec, ICDC-Voca, ADPR, Lutheran Food for the Hungry, IFH (Food Fund for Hungry), GTZ, and SG2000 (Langyintuo 2004:8).

²⁴ linked to V&M Grain

Some of the savings is rebated to the associations through price premiums (Howard et al. 2001:37).²⁵

Though requiring time, the emerging competition and improved distribution methods appear to be imparting a new dynamic to seed markets, which for long have been hampered by the free distribution of seeds through various donor programmes that accounted for the bulk of the formal seed market. Indeed, in 2001, the total formal and informal seed markets equalled \$11 million. Of that, \$5 million was through informal markets; \$5 million, through free emergency programmes; and merely \$1 million, through the commercial retail network, a value too small to be efficient (Massingue et al. 2004:11). Largely because the commercial market is so small, no significant quantities of seed, except for maize, rice and vegetables, “are sold on the domestic retail market. ... More than 90% of the seed ... distributed for secondary field crops, including sorghum, pearl millet, groundnut[s], cowpea[s], pigeon pea[s], is imported for subsidized delivery through relief or development programs. [Consequently,] the seed companies and traders do not believe there is significant retail demand for these alternative seed crops” (Rohrbach et al. 2001:13).

To encourage farmers to use improved seeds and other inputs and to overcome the rigidity of the prior system of distributing centrally determined input kits often inappropriate for local circumstances, the government received aid in 2003 and 2004 to begin to organize input trade fairs targeting the poorest families in southern and central of Mozambique while simultaneously distributing disaster relief (FAO 2004:4-5).²⁶ Through this project, the District Directorates of Agriculture, with the cooperation of various NGOs, gives purchase vouchers to female-headed households and the neediest farmers²⁷ and organizes input trade fairs in rural centres. Seed vendors “redeem the vouchers at the end of the fair. At these fairs, however, all types of seeds ranging from certified seed to pure grains are displayed for sale and, since farmers [do not] discriminate by company but [rather by] price, certified seed[s] are less competitive at the fairs” (Langyintuo 2004:9). Other problems also exist. The “beneficiaries are not always selected impartially. There are cases of community leaders profiting from emergency aid, consolidating their power in exchange for putting certain names on the list of beneficiaries” (FAO 2004:13). Moreover, though benefiting—directly and indirectly—nearly a quarter of a million people, the input fairs still benefit only a small fraction of the agricultural population. The government is currently evaluating whether to greatly expand their coverage.

Of all seeds, only cotton—planted by 6% of all farmers—has a regime enforced by law whereby the concessionaires must supply contract farmers with seeds free of charge. The cotton concessionaires “import basic seed, and multiply and distribute it to their own growers. Most seed used, however, is derived from the preceding season’s crop. ... Average cotton yields are quite low, in part due to the lack of improved material adapted for Mozambican conditions. The national program has not released any new cotton varieties since 1978” (Rohrbach et al. 2001:12). Free seed and inadequate extension systems encourage wastage. “Interviews revealed that ... [some] farmers were found to be planting as many as 100 seeds in a single planting hole where only four to five seeds would have been adequate. Such wasteful practices continue to erode the cost structure of cotton companies in Mozambique” (GDS 2005:29).

²⁵ Though enabling the concessionaires to cut costs (e.g., by eliminating the need for *capatazes*), the associations do not always get compensated for this service. For example, according to Mole (2005:76), SODAN’s failure to reward the associations for distributing inputs and serving as the intermediate buyer of the farmers’ cotton “created discontent among some association members”.

²⁶ a grant of roughly \$1,000,000 from the UK

²⁷ In phase one (2002-03), the project assisted 32,820 farmers at 67 fairs and, in phase II (2003-04), 13,900 farmers at 28 fairs, which, including family members, is about a quarter of a million people but still a small fraction Mozambique’s 3.3 million small farmers (FAO 2004:10-11).

Severe problems have existed with the quality of the seed given out. Used for more than a decade, the present cotton varieties have low yields and poor quality (World Bank 2003b:vlvi). In the 1999/2000 season, for example, 46% of the cotton farmers in Nampula province complained about the seeds' deficient germination (Pitoro et al. 2001:5). "The quality of Mozambican cotton fibre is still low and this is the main reason why it is sold at a lower price. The ginning outrun (cotton lint or seed cotton production) was 32% to 35% in the last decade, compared to an average of 42% in other African countries" (da Silva and Carrilho 2003:102). "In the past, [chemically] dressing seed was a common practice, but today very little is distributed treated" (Ofiço and Tschirley 2003:25). "In the case of farmers associated with ... [one] private cotton company, some farmers used treated seed which require[s] approximately two sprays per season, while farmers using untreated seeds required the standard five sprays" (GDS 2005:27). The mandatory free distribution of seed leaves the concessionaires little way to recapture the high costs for the fungicides. Finally, the application of a uniform price for bulk cotton significantly reduces the incentive for farmers to use improved seeds, apply pesticides and fertilizers correctly, and avoid batch mixing, which causes problems for the ginners and lessens the ultimate value of processed cotton (GDS 2005:29; Ofiço and Tschirley 2003:25).²⁸ Largely due to these problems plus higher freight costs, Horus Enterprises (2005:88) found that the price paid to Mozambican farmers for seed cotton is far lower than in Tanzania, Zimbabwe, Mali, Benin, and Burkino Faso and, in 2002/03, only permitted farmers to net about a third of the minimum agricultural wage per day worked.²⁹

Low productivity and poor quality affect not only the cotton farmers and concessionaires but also greatly impede the recovery of Mozambique's once strong textile industry (Coughlin 2001:21). The National Cotton Institute has long recognized that the low productivity and the poor quality of cotton seed severely afflict the **entire value chain**. As part of its strategic plan for the sector (adopted in 2003), the institute has developed two new varieties—CA324 and ISA205—that are currently being propagated. Both varieties yield 600 to 800 kg/h whereas, previously, farmers got 300 to 400 kg/h. Moreover, ISA205 also achieves 36% fibre content as opposed to 33% for earlier cultures. CA324, however, lacks tiny protective hairs and, hence, is highly susceptible to insect bites that cause diseases. Recognizing this, the institute is currently negotiating with CIRAD,³⁰ a French agricultural research centre, to add that genetic characteristic.³¹

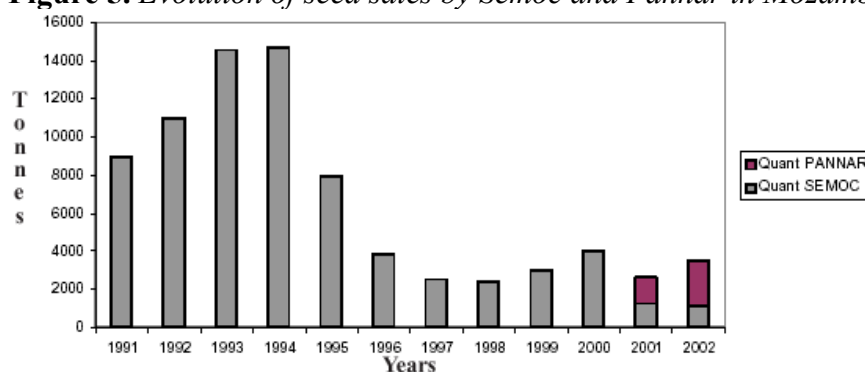
²⁸ "Outgrowers in a concession area do not necessarily use the same seed variety. While this in of itself is not a problem, poor post harvest handling practices, particularly during collection, results in batch mixing, where cotton from different seed varieties are mixed into a single batch. As a consequence, uniform fibre quality is virtually impossible to achieve, which becomes a problem during the ginning phase", especially in zones with many concessionaires. Moreover, "some farmers use retained hybrid seeds from the previous year rather than ... [using] fresh seeds each growing season. This further compromises fibre quality. ... [Since] fibre classification to differentiate cotton quality continues to be a weak feature of the government price-guarantee scheme, poor seeding practices, the lack of access to high quality seeds, combined with a single fixed price for raw cotton places cotton companies in a position of substantial comparative disadvantage" (Global Development Solutions 2005:30).

²⁹ For the campaign, the minimum price paid to Mozambican farmers was "10% to 15% of Index A as compared to 20% to 30%" in the other five countries though the concessionaires often paid marginally more than the announced minimum (HORUS Enterprises 2005:87-88).

³⁰ Centre de Cooperation Internationale en Recherche Agronomique pour le Développement

³¹ interviews with Erasmo Muhate, director, National Cotton Institute, 24/1/2001 and 18/5/2006

Figure 5. *Evolution of seed sales by Semoc and Pannar in Mozambique*



Source: Massingue et al. (2004:9)

Regulatory Controls

Though the government regulates and sometimes vets seeds, pesticides, and fertilizers to ensure their quality and appropriateness, the controls—especially for seeds—have been overly restrictive, excessively bureaucratic, and partly ignored. Writing just before the revised seed regulations were approved in 2001, Rohrbach et al. (2001:7) reported that:

no new seed varieties have been legally sanctioned for distribution or sale in Mozambique since 1995. In comparison, the seed industry in South Africa has released over 30 new crop varieties during the last five years. The value of the listing is further undermined by the fact that many of the varieties on the 1995 registration list are not currently available for sale or distribution in Mozambique. Available estimates suggest that only 44 of 120 varieties on the 1995 registration list are even potentially available for sale. Foundation seed may exist in Mozambique for less than 10 of these varieties though foundation seed stocks of many of the others are maintained by neighbouring countries. The significance of the listing is also brought into question by the fact that an estimated 14 seed varieties are not on any variety registration list (either the 1995 listing or the new draft listing) yet are currently being sold in the country.

Moreover, the 1995 list, itself, “was based more on the fact that these varieties were already being distributed and sold in the country, than on performance data in experimental trials” (Rohrbach et al. 2001:6).

Including new varieties on the Official List of Varieties was difficult because the seed regulations of 1995:

- required three layers of approvals³² hampered by the absence of key personnel required for a meeting of the National Seed Commission, the failure to delegate authority, and the long delays in getting changes officially published in the *Boletim da República*; and
- mandated extensive local testing over three years even for varieties that had been amply tested and certified in similar environments in countries within the Southern Africa Development Community (Rohrbach et al. 2001:6).

³² The 1995 regulation required approval first by the Subcommittee for the Registration and Licensing of Seeds, then by the National Seed Commission, and finally by the Minister of Agriculture and that only became official once published in the *Boletim da República*.

The revised regulations of 2001 eased the approval process by:

- allowing the minister to approve changes upon the recommendation of the Subcommittee for the Registration and Licensing of Seeds after merely giving the National Seed Commission an opportunity to express its opinion; and
- reducing the time required for local testing to two instead of three years.

While continuing the requirement that, to be registered and legally marketable, seed must be DUS (distinctive, uniform and stable) or have VCU (value for cultivation and use), the revised regulations explicitly allow widely used traditional and local varieties to be registered *if proved* to meet *DUS and VCU criteria* (Mozambique 2001a: Article 3, para. 1 and 3). The inclusion of traditional and local varieties was necessary because, without the caveat for such varieties, the law would impose, *in theory*, standardized crops and outlaw nearly half the seeds currently traded within Mozambique—a result both impractical and highly undesirable economically.³³

The law also contains a grave, practical contradiction: “it is impossible to fulfil the criteria of distinctiveness, uniformity and stability (DUS), plus value for cultivation and use (VCU) ... without using breeding techniques which have become more and more sophisticated and are not available to farmers” (Kastler 2005:11). To be DUS and VCU compliant, seed must be developed and standardized in laboratories and research stations. By contrast, “traditional peasant techniques of seed conservation and selection ... adapt crops to the diversity of *terroirs*³⁴ and climates and to how the crop is used after harvest. Such crops are not necessarily stable outside of their *terroirs*, nor are they uniform due to the natural diversity within the crop, and they are constantly evolving. Nor will they meet the criteria for VCU as they are not adapted to industrial processing or widespread distribution” (Kastler 2005:12). “A new seed category, *less than guaranteed*, [is needed] ... to accommodate” traditional and local varieties. “It is not coherent that ... [traditional and local varieties] be **allowed** to participate in seed fairs organized by the government and cooperating NGOs and still be **denied** legal recognition” (Massingue et al. 2004:6, emphasis added). Though, unlike many African governments,³⁵ the Mozambican authorities do not persecute farmers who sell uncertified seeds through informal channels, the law needs to be amended to remedy its sharp contradiction with farmers’ practices and needs.

Besides tackling—albeit inadequately—the issue of seed registration, the revised regulation made it easier to register seed merchants in rural areas or places distant from the provincial capitals. Before, they needed an official endorsement from the Ministry of Agriculture before requesting a license from the Ministry of Industry and Commerce. Now, an endorsement from the local representatives of the Ministry of Agriculture suffices (Mozambique 2001a: Article 29, para. 3). The new regulation failed, however, to incorporate recommendations to (i) facilitate the local registration of seeds registered in other SADC countries and (ii) relax and simplify overly strict phytosanitary controls that are “almost impossible to enforce” (Rohrbach et al. 2001:25;

³³ For this reason, these seeds do not correspond, in legal terms, to varieties—they are ‘non-varieties’. Therefore, plants selected for diversified, organic or low-input agricultural systems, as well as nearby marketing systems, fall outside the trade-driven definition of ‘varieties’.

³⁴ land in relation to soil, climate and crops

³⁵ For example, “in Zimbabwe, ... seed certification is mandatory for 10 major crops and ... enforcement is particularly heavy-handed for maize. Open-pollinated varieties of maize and sorghum cannot be sold in Zimbabwe. By law, farmers can only buy hybrid seeds of these crops. ... Kenya’s seed agency, KEPHIS, [also takes] its laws seriously. Since it was established in 1996, it has been dishing out fines to seed dealers that operate without a licence or that sell non-certified seed. It has even imposed certification rules on small-scale seed projects for local food crops like beans and sorghum. KEPHIS is particularly adamant about not letting farmers sell their uncertified maize seed, currently responsible for over one-half of Kenya’s maize seed needs. The Sierra Leone Seed Board is running after NGOs and seed dealers for side-stepping the certification process in distributing rice and groundnut seeds. In Uganda, where over 90% of seeds are farm-saved, access to credit is commonly tied to the mandatory use of certified seed” (GRAIN 2005:32 and 34).

Howard et al. 2001:27; Rohrbach and Howard 2004).³⁶ Authorities could also pro-actively seek out, test and, when appropriate, distribute the varieties that perform well in neighbouring countries. The best solution, however, would be to streamline and harmonise seed laws and regulations throughout SADC and thereby promote regional seed trade (Rohrbach et al. 2001:25-26). Indeed,

most observers agree that the regulatory standards currently guiding seed trade in southern Africa are too strict. Phytosanitary standards are particularly strict. Yet many of these regulations are probably unnecessary. [For example,] when phytosanitary regulations were closely examined in a recent set of meetings chaired by ASARECA³⁷ in eastern Africa, an initial listing of more than 50 phytosanitary restrictions was ultimately reduced to three. In some cases, restrictions were in place for diseases that are not seed borne. In other cases, restrictions were requested for diseases that do not exist in east Africa. Once the discussion agreed on the objective of promoting seed trade, rather than restricting seed movements, the barriers came down (Rohrbach et al. 2001:25).

Agrochemicals

Though, during the early 1980s when Mozambique emphasized large-scale state farms, the country consumed annually between 40,000t and 80,000t of fertilizer and two to three million litres of pesticides, “agrochemical use fell dramatically through the mid-1980s due to the war and collapse of the state farm sector”.³⁸ Even after peace came in late 1992, the use of agrochemicals picked up but very slowly due to the slow growth of the large-scale farming sector, the main user of such inputs. By the late 1990s, all of Mozambique used only 10,000t of fertilizers³⁹ and 400,000 lt/kg of pesticides (Howard et al. 1998:vi).⁴⁰ Since then, contract farming and sugarcane

³⁶ “The South African Development Community has recently decided that given the ongoing lack of coherence in the region it will put the harmonisation of national seed laws on hold and focus instead on the enactment of a separate parallel regional system for variety registration and release. The central element of this system is a regional catalogue for varieties that meet [the] International Convention for the Protection of New Varieties of Plants’ DUS criteria and a minimum of performance data. Any variety registered in the regional catalogue will automatically be approved for sale in all member countries, although individual countries can object. There is a plan to develop a second regional catalogue for ‘landraces’ and established popular varieties that don’t meet the DUS criteria, but this catalogue will be ‘for information purposes only’ and ‘would not as such provide market access’” (GRAIN 2005:34).

³⁷ Association for Strengthening Agricultural Research in Eastern and Central Africa

³⁸ The country has a defunct and now obsolete fertilizer factory, the Empresa Química Geral, which operated between 1968 and 1985. Its rehabilitation would cost between \$10 million and \$15 million and is of doubtful viability given how small the national market is. “Three private companies, EMOP, Shell, and BASF, each own pesticide formulation facilities in Mozambique. Their combined total capacity is 7,700 tonnes, but national pesticide consumption averaged less than 1,000 tonnes annually” during the 1990s (Howard et al. 1998:15).

³⁹ By contrast, Kenya imported 150,000t of fertilizer in 1998 (Magnay 1998 cited by Gordon 2000:12).

⁴⁰ To support food production, between 1986 and 2000, the Japanese KRII program “provided in-kind grants of pesticides, fertilizers and agricultural machinery worth approximately \$9 million annually”, supplying “one-third of national pesticide demand and virtually all fertilizer used in Mozambique” used by the country. During the 1990s, these supplies were “almost exclusively used by the private sector and the cotton concessionaires” (Gemo, Eicher and Teclemariam 2005:76). Moreover, “recipients of KRII agrochemicals are supposed to pay a countervalue of ⅓ f.o.b. for pesticides and ⅓ [to] 100% c.i.f. for fertilizers and equipment into an agricultural development fund but, in practice, a large part of the countervalue goes uncollected. ... While the KRII subsidy is intended for smallholders, there is no public reporting of these subsidies and no assurance that the cotton companies or other traders are transmitting the subsidies to their smallholder growers. Instead, the subsidy permits cotton companies to set a lower producer price for cotton, thus increasing their profits” (Howard et al. 1998:vii, 16 and 17).

In late 1999, the Department of Economic Analysis in the Ministry of Agriculture and Fishing also reported that the “bureaucracy involved in extracting the products from the port is so great that orders for a given year arrive and remain in the ports for 12 to 18 months, incurring storage charges and, in some cases, causing the product to

plantations have greatly expanded or revived, which, though data is unavailable, has surely increased the usage of agrochemicals.

Figure 6. *Fertiliser consumption per hectare of cropland, 1961-1998*



Source: http://earthtrends.wri.org/pdf_library/country_profiles/agr_cou_508.pdf

Among small farmers, only 2.7% use fertilizer and 4.5%, pesticides, and those who do are mostly contract farmers who use them almost exclusively for cash crops such as cotton and tobacco.⁴¹ The situation is but little better for medium-scale farmers (11%, fertilizers; 10.3%, pesticides), and even among large farmers only a third use modern inputs (Annex Table 2).⁴² Unless such inputs can be lent and repaid at harvest, most small and medium farmers are crushed by poverty and have no capital to invest in modern inputs, especially considering the risks entailed if the harvest is poor due to a drought, flood or plague. For example, during the late 1990s, Howard et al. (1999:7) concluded that, “in general, profits from the use of Sasakawa-Global technology [input kits for maize] are not significantly higher than low-input technologies (after farmers pay their input loans) and the use of high-external-input technologies is riskier than low-input technologies” (Table 4). However, the National Directorate for Extension Services (DNER) and Sasakawa-Global opposed changing the kit despite economic analyses of tests of fertilizers in Nampula that indicated that “profitability would improve greatly by reducing the application of fertilizer, especially P [phosphorous] and K [potassium]” (DAP 1999:22).

The prices for fertilizer and pesticides are high because of unnecessarily high c.i.f. costs of imported chemicals, high local transport costs, and abnormally high margins charged by some suppliers, especially when they have a regional monopoly as, for example, in the contract farming schemes.⁴³ Though far from comprehensive, the literature reports:

deteriorate” (DAP 1999:19). DAP’s report alleged that the products were highly overpriced though its data was far from convincing, being based on data from merely one source: a competing fertilizer merchant. In 1999 and 2000, the program was embroiled in allegations of corruption and incompetent administration in Mozambique, Tanzania and elsewhere in the region and new imports were discontinued.

After a long, costly effort to inventory, collect, and warehouse pesticides made obsolete by prolonged storage and to identify an appropriate way and place to destroy them, the project announced, in early 2006, that it would incinerate the pesticides inside Mozambique instead of using an external contractor. When finished, the inventory, collection, storage, training, and incineration will have cost, in total, \$2.3 million (*Notícias* 10/2/2006:1).

⁴¹ In the Zambezi Valley, “among tobacco growers, 97.4% report using pesticides in tobacco fields, while 2.1% use [them] in vegetable fields. Among non-tobacco growers, about 3.1% report using pesticides in vegetables. In cotton areas, about 95.0% of cotton growers ... apply pesticide in cotton fields and 0.9% apply [it] in vegetable fields” (Benfica et al. 2005:20).

⁴² Between 1995/6 and 2002/3, farm households using chemical fertiliser rose from 1% to 4% and, for manure, from 3% to 11% (World Bank 2005b:20).

⁴³ For example, in the Zambezi Valley, the concession companies hold a tight monopoly on agrochemicals. Of cotton growers who use pesticides, 96.6% get them from the concessionaires and, for tobacco, 93.9% do. Of the tobacco farmers who use fertilizers, 98.6% obtain them from the concessionaires (Benfica et al. 2005:19). Also, in early 2006, the Sociedade Algodoeira de Namialo (Sanam) bought out the Sociedade de Desenvolvimento Algodoeiro de Manialo (Sodan) thus gaining a monopoly over cotton production in Nampula Province and, consequently, a monopsony over the supply of agrochemicals for the 50,000 farmers in the concession areas (*Notícias: Economia e Negócios*, 3/2/06:1).

- ***Excessive c.i.f. costs for fertilizer:*** “Given the small market demand for fertilizer, dealer/distributors are generally unable to negotiate a discount. For example, minimum order for fertilizers from Saudi Arabia is 10,000 tonnes per order. At this volume, the delivered price of urea in Beira is approximately \$295/tonne. Given that even the largest dealer/distributors in Mozambique only order between 3,000 to 7,000 tones of urea per year, local companies are generally unable to purchase fertilizers at competitive prices. As a consequence, dealer/distributors have little choice but to purchase fertilizers from South Africa, at prices as high as \$415/tonne delivered in Maputo” and yet higher in Beira (GDS 2005:6). These costs are passed onto farmers. For example, “purchased seed and fertilizer make up 68% to 80% of total maize production costs (exclusive of family labour) in the three regions [studied].⁴⁴ ... [Hence,] even small reductions in the farm gate cost of fertilizer and seed (e.g., by reducing transport and other marketing costs) could significantly increase farm profits.” For example, a 25% reduction in agrochemical costs would have increased net incomes of high-input farmers by more than 100% in two regions and by 28% in the third region (Howard et al. 2000:25).

During the 1980s, Interquímica imported all agrochemicals whereas large agricultural enterprises may now buy from their mother companies abroad or from local representatives (e.g., Agroquímicos, Tecap, Zeneca) of multinational chemical firms, e.g., BASF or Ciba-Geigy (Howard et al. 1998:16). In a market so small, this fragmentation eliminates any possibility of achieving bulk-order discounts. Indeed, this is a general problem throughout sub-Saharan Africa. “Although liberalisation has removed many of the restrictions on the type of fertiliser that may be imported, previous customs for specific formulations tend to be followed, which eliminate the possibility of bulk orders. Debrah (2000) gives the example of the minor differences in cotton fertiliser formulations across neighbouring West African states, leading to the necessity of small, individual import orders and consequent higher prices” (Tripp 2003:10). Recognizing the problem, a study in 1999 by the Economics Directorate in the Ministry of Agriculture and Fishing recommended:

investigating the possibility of conglomerating regional orders for fertilizers when this would achieve economies of scale in transportation and distribution and, hence, reduce significantly the costs of fertilizers for farmers. Mozambique is strategically positioned to take advantage of economies of scale through a system that would combine regional fertilizer orders since joint orders with Malawi, Zimbabwe, and South Africa could enter through the Nacala, Beira and Maputo ports (DAP 1999:52).

Similarly, the a USAID-financed study by the International Fertilizer Centre (2000:30) recommended that “restrictive product specifications can be simplified to international norms ... [and] regional cooperation through primary ports can provide the means to achieve economies of scale and on-shore bagging of bulk shipments”.

To date, nothing has been done to achieve these discounts on a regional scale or, at least, to evaluate the practical and economic viability of mobilizing or requiring importers within Mozambique to form **private**, buyers’ associations to conglomerate purchases of the same chemicals going through the same ports (e.g., Nacala, Beira, Maputo) and, thereby, achieve discounts.⁴⁵

⁴⁴ Ribáuè, Malema, Monapo and Maconta

⁴⁵ The idea of joint purchasing would probably meet resistance, albeit camouflaged, from any importers or concessionaires using transfer pricing to shift profits out of the country without paying taxes.

- **Excessive markup on pesticides:**⁴⁶

- “According to interviews, industry norms for markups [on pesticides for cotton] range from 15% [to] 20%. But during peak seasons and when there are supply shortages, dealer/distributors enjoy even higher margins, particularly for more expensive insecticides. According to interviews, margins may go as high as 65% [to] 100% of f.o.b. price” (GDS 2005:36). *That is the claim* but an analysis of data for three different insecticides imported by one agent revealed that the *normal markups* on the c.i.f. price range, in fact, between 35% and 57% (Annex Table 6).
- “Although cotton companies have a number of insecticides to choose from, prices between various insecticides do not vary widely and thus do not justify the wide discrepancy between the estimated cost of delivering sprays to farmers (151,819 Mt/ha) and the cost claimed by the joint venture concession companies (313,800 Mt) and deducted from the cotton farmer’s revenue. No reasonable explanation could be found to rationalize this discrepancy, which suggests that further investigation might be required” (GDS 2005:38).

- **High prices and big expenditures for agrochemicals:** The high prices and costs for inputs reduce the viability of exports for many crops. For bananas, the application of fertilizers and pesticides comprises 40.8% of total operational costs including depreciation and plant maintenance and, for mangoes, 42%. These costs help to explain why the estimated retail price of bananas exported from Mozambique to South Africa would be 5% **more costly** than the actual retail price as of January 2004 (GDS 2005: Table 35, p. 91). And, at least for mangoes, the share of agrochemicals in total production costs is between 24% to 50% higher in Mozambique than for some of the world’s largest producers, e.g., Pakistan, India and Philippines (Table 5).

For maize, Howard (1998:ix) reported that “the cost of inputs is very high compared to output prices currently faced by farmers. Using June prices, the ratio of the cost of the total input package to the price of one kilogram of maize ranges from 1,504 in Region 8 (Monapo/Meconta, Nampula Province) to 2,074 in Regions 4 and 10 in Manica Province. This means that farmers must produce between 1,504 and 2,074 kilograms of maize to pay for the package of inputs used on one hectare. Using prices from our economic analysis, we calculated ratios in Nampula that ranged from 7174 to 3,165. [By comparison,] in Manica, the economic ratios ranged from a low of 700 to a high of only 873.”

Other issues also merit research:

- Since, for many cash crops, Mozambique relies on concessionaires often granted exclusivity for entire districts, they have, at present, an absolute prerogative to set the prices and the implicit interest rates applied to the sale of inputs for cash or credit. No mechanism—mandatory or persuasive, private or governmental—exists to monitor and ensure that those charges are reasonable and justifiable in view of the costs incurred. Eventually, competition among input suppliers will intensify in those districts and eliminate the problem. Till then, however, the scope for abuse is manifest. But are these regional monopolists abusing their market power? For input loans, recent evidence from seven sub-Saharan countries revealed that:

concerning the terms and impact of the company credit, the overall conclusion ... is that, in general, there is little evidence that smallholder farming contracts and the related input credit operations are of an exploitative nature. Most of the operations have a potential to benefit both the company and the farmer. An exception in this general

⁴⁶ Though meriting research, the literature appears to be silent about the local markups applied to fertilizers.

picture are the **Mozambican cotton companies** working on monopoly concessions, as the prices of seed cotton offered on these schemes are low in regional comparison and the **interest rates** charged on smallholder advances are **clearly higher** than is typical for operations of this type. Thus, despite operating with lower risks and, formally at least, no competition within their concessions, these companies do not seem to pass the benefits of their favourable market position to the smallholders.⁴⁷

... [Within the region,] by far the most common is the practice that no interest is charged on the outstanding loan balances. This applies to nearly all the schemes. ... [However,] of the large cotton companies [in northern Mozambique], CANAM charges on input credit a high interest rate of 2.5% per month on the outstanding balance⁴⁸ while JFS/SODAN charges ... 30% per annum (IFAD 2003:29).

By contrast, the Tobacco Association of Zambia, a commercial entity, “prices the input at the wholesale price plus 15% except for the fertiliser, which is priced at wholesale price plus 3%. On top of this, farmers pay an interest rate of 8.5% on outstanding loan balances” (IFAD 2003:72).

More research is needed to determine the extent of the problem, if any, among the various concessionaires and to propose how—preferably with a light hand or, better yet, cooperation—to remedy or greatly ameliorate any confirmed patterns of abuse. At issue are sales for cash or credit. *If for cash*, is the markup over c.i.f. justifiable considering the handling, transport, storage and financial costs? *If for credit*, is the implicit true annual interest rate⁴⁹ justifiable or usurious considering the additional costs for loan defaults and the normal interest rates for bank loans.⁵⁰

One way to reduce the real interest rate charged on inputs advanced to smallholders would be for the government to persuade concessionaires to encourage the formation of savings and credit cooperatives, initially among their direct employees and, once a cooperative were solidified, to expand to include associated farmers.⁵¹ The cooperatives could then loan money for equipment, inputs, and other working capital to experienced and reliable farmers who authorize the concessionaire to deduct the value of the loan plus interest from their harvest proceeds and remit it to the cooperative. By restricting loans to farmers with proven performance and repayment records, the credit unions would achieve extraordinarily low default ratios thus ensuring a low cost structure and their own sustainability. This, in turn, would allow them to charge low interest rates to credit worthy farmers, thereby boosting local incomes, expenditures and—via local multiplier effects—additional demand and job creation in small commerce and diverse services.

⁴⁷ endorsed in the World Bank report by de Sousa (2005:3).

⁴⁸ “In the last season [2003], the recovery rate of seasonal input credits was 95%, which the company [CANAN] considers adequate for a viable operation. ... The company finances this operation with its own funds or overseas loans” (IFAD 2003:79).

⁴⁹ For example, Ofiço and Tschirley (2003:29-30) discuss credit selection and recovery on the cotton schemes while ignoring its cost to the farmer though this can be calculated from the difference (converted to a true annual interest rate) between the cash price for the agrochemicals and the price deducted when, months later, the farmer turns in his harvest or, in other arrangements, by the discount in the price/kg she must accept for her crop if she took inputs on credit. The interest rate is typically implicit. To illustrate, in the Philippines, “rates as high as 5% per month are quoted for input loans from rice traders to farmers”; in the Sindh region of Pakistan, traders get 5% per month on input loans; and, in India, 2% to 4% per month for a six-month loan till the harvest comes (Pearce 2003:2).

⁵⁰ Though the default rates in Mozambique have been low (< 10%) or even zero in areas with no alternative buyers, they are high in areas with multiple buyers and, in 1999/2000, had soared up to 40% in the prime production zones of Nampula? (Box 1) (Tschirley, Ofiço and Boughton 2005:36).

⁵¹ Tchuma, Ltd., has been trying to obtain financing for a proposal to do this in Manica.— *Source*: interview with Gildo Lucas, CEO, Tchuma, Sarl., 10/4/06.

- Control of the quality of agrochemicals is another issue. Elsewhere in Africa problems are known to exist. For example, “a study in West Africa (Visker et al. 1996) found 43% of samples to be nutrient deficient (mostly because of poor process control), 58% with low bag weight, and a number of cases of inadequate labelling. The governments concerned had no quality control mechanisms in place” (Tripp 2003:10). Do problems exist in Mozambique?⁵² Again the literature is silent.
- The application of pesticides is often suboptimal. This occurs because small farmers often cannot afford the chemicals. But in concession areas, that is not the main problem. Farmers’ focus groups repeatedly affirm that:

access to the sprayers is a severe constraint which impairs significantly the effectiveness of applications. At times one sprayer has to be shared by more than 30 farmers. The untimely access is further exacerbated by the limited access to the batteries required to charge the device. If the effectiveness of insecticides is considered to hinge mostly on the application technique, the current practices may explain much of the observed poor cotton yields (Tschirley, Ofiço and Boughton 2005:35).

- “Mishandling of the pesticides is [also] pervasive. ... Not one of the more than 100 focus group farmers used protective measure[s] during the handling and application of pesticides despite being aware of the potential hazard. [Nevertheless,] all indicated that women don’t handle pesticides” (Tschirley, Ofiço and Boughton 2005:35).
- The concessionaires’ contracts with the government typically oblige them to help to stimulate the general development of **all** farmers in their zones. But whether and how well they comply varies greatly between companies. Some invest much to construct and maintain roads, dams, schools, and health posts; others, very little (Hanlon 2006). The significance of these expenditures, however, is critical when evaluating the benefits that these schemes bring the nation and the people within their zones. Moreover, such investments are not philanthropy. They are paid for by the grant of a monopoly over the supply of inputs and a monopsony over the cash crop within the concessionaire’s zones. Those investments also benefit the companies directly (e.g., road, dams) and in the long-term (e.g., schools). The literature, however, provides no systematic analysis comparing contracts and the scale and impact of the companies’ efforts to promote general development in their zones.

⁵² Such problems are especially relevant when “selling fertilizer in small packages (as small as one kilogram)” as a well proven way to encourage poor farmers to experiment with and use fertilizer. “For small-packs to succeed, however, quality control becomes an even more important issue than it is with sales of standard 50 kilogram sacks” (Kelly 2005:33).

Box 1**Dunavant's High Credit-Recovery System in Zambia**

On credit collection, especially for areas with many alternative cotton buyers, perhaps a lesson can be had from Zambia. Due to plummeting international cotton prices, producer prices paid to Zambian farmers "fell from \$0.56/kg in 1995 to \$0.18 in 1999". With farmers feeling exploited, "the loan repayment rate dropped from almost 86% in 1996 to about 65% in 1999 and 2000.... Since over 90% of the seed cotton ginned up to 1997 was produced by farmers participating in outgrower schemes, ... outgrower loan default[s] ... threatened the entire sector. Production in 2000 fell to less than half the level of 1998.

"Since this nadir, the sector has undergone major structural change and has recovered dramatically.... [Given] the decline of the cotton trading sector," Dunavant adopted two strategies. "First, it launched, in 1999, and over the next several years, ... refined its 'Distributor System', which dramatically improved credit repayment rates among farmers. Second, Dunavant used this system to aggressively expand its production network. Partly as a result, national production tripled between 2000 and 2003, and credit repayment improved from about 65% to over 90%....

"The Distributor System involved eliminating nearly all directly employed extension agents and selectively offering them a formal written contract as an independent distributor. These distributors were responsible for identifying farmers to whom they wished to provide cotton inputs, receiving the inputs on credit from Dunavant, delivering these inputs to their selected farmers along with technical advice, and ensuring the sale of the farmers' crop to Dunavant in order to recover the input credit. The distributor's remuneration is **directly tied** to the amount of **credit recovered**, on an **increasing scale**. The company screens all distributors, and requires that each produce cotton themselves and live in the same area as the farmers to whom they provide services."

◆◆◆

Source: Tschirley, Zulu and Shaffer (2004: 5 and 11, emphasis added)

Table 4. Financial profitability of high and low external input usage, Mozambique, 1996/97 and 1997/98

	1996/97	1997/98	
	SG	SG	Extension Program Non-program
Net income/ha (USD)		(numbers in parentheses are negative)	
September-October price	66	(6)-105	111-144 90-125
November-December price	196	58-197	175-216 142-185
Net income/labor day (USD)			
September-October price	.64	(0.1)-1.4	0.9-1.2 0.7-0.9
November-December price	2.0	1.0-2.6	1.3-2.0 1.0-1.4
Avg. daily wage rate	1.22	1.1-1.5	1.1-1.5 1.1-1.5
Under optimal conditions			
Net income/ha (USD)			
September-October price		225	216 209
November-December price		366	311 295
Net income/labor day (USD)			
September-October price		2.7	1.4 1.1
November-December price		4.4	2.0 1.5

Source: Howard (1999:7)

Table 5. Mango yields and costs: International outlook

Country	Yield (kg/ha)	Farm gate production costs (\$/kg)	Share of agrochemicals in total production costs (%)	Variety
Philippines	6,800	0.22	34	Carabao
India	9,200	0.14	34	Dasher, Langra, Neelam, Chausa
Pakistan	7,300	0.17	28	Chausa, Langra, Sindheri
Puerto Rico	17,000	--	--	Florida types (Kent, T. Atkins, Keitt, etc.)
Mexico	9,200	--	--	Florida types (Kent, T. Atkins, Keitt, etc.)
Mozambique*	10,000	0.21	42	Florida types (Kent, T. Atkins, Keitt, etc.)
World average	7,650	n.a.	n.a.	

Source: GDS (2005:93)

* Based on the reported 'expected return' at full tree maturity, with the current level of agrochemical usage.

Food Production and Technology since Independence

Once peace came in 1992 and millions of exiles began to return to their farms, the production of both food and cash crops surged⁵³ with increased land under till. "The annual growth of food grains from 1994 to 1999 was 16%; that from 2001 (after the flood) to 2004 was 5.5%" while, between 1996 to 2003, the agriculture, livestock and forestry sectors grew 6.6% p.a., mainly propelled by the 3.3% p.a. expansion of cultivated area and 1.7% p.a. growth in the number of farm households between 1992 and 2003 (World Bank 2005a:18 and 2005b:16-19). As a consequence, the poverty index declined 16.1% between 1996/7 and 2002/3 (Table 6, Figures 7 and 8, and Annex Table 7).

Mozambique's agriculture is, however, strongly bipolar, split between the 3.2 million small farmers, producing 95% of agricultural GDP, and 400 or so commercial farms, 5%. Moreover, of the total agricultural labour force, two thirds are women and, "in 2003, about 23% of rural households were headed by females" (World Bank 2005:3). Although, in Mozambique, land is usually available, smallholders typically farm 1.0 to 1.5 hectares, their maximum since few have oxen for ploughing, and tractor services are scarce or economically risky and unaffordable. Thus constrained, to increase income, they must use improved farming and storage technologies—pre-industrial or modern.

The scope for improvement is large. "Average crop yields are about half of the regional average" though smallholders managed to "raise their maize yields from a nadir of 160 kg/ha in 1992 to over 1,000 in 1999, thereby catching up with the pre-Independence (1972) peak" (World Bank 2005b:5 and 2005a:18). Among smallholders, however, the **recent high rates of growth** in production are **deemed unsustainable**. Till now, growth came mostly from increased labour and additional hectares under cultivation since "yield[s] for basic food crops in the smallholder sector ... have been basically flat over the past decade due to the limited adoption and use of agricultural technologies" (World Bank 2005b:17 and 23). With the exiles now resettled, growth from those sources will slow greatly.

Though blessed with vast under- or unused arable land in most provinces (only 15% of arable land is cultivated), ironically, mainly due to the way the local social hierarchy operates, some farmers are land poor. Others have ready access to land and prefer to expand their plots rather than labouring to increase the productivity of fixed fields. Thus, *if labour is available*, small farmers usually opt for farmland expansion rather than agricultural intensification (Marrule 1998:102; Bias and Donovan 2003:6; Holmén 2005:67 and 80; Kydd *et al.* 2002). However, in a

⁵³ except in 2000 when the cyclone hit

country with no landless peasantry, labour is often a big constraint for a small farmer. The option is intensification whose viability is determined by market access and demand (local and foreign) for agricultural products and by the efficacy, availability and accessibility of the right inputs and other technologies.

Faced with constraints on labour, future growth in agricultural production per capita must flow from the application of improved agricultural techniques. Though the use of irrigation, principally for vegetable patches, has become more popular with 4% of farmers using it in 1996 and 11% in 2002, growth in the use of animal traction—mostly for transportation instead of ploughing, except in southern Mozambique⁵⁴—seems to have stalled. In 1996, 7% of farm households used work animals, in 2000, 11%, and in 2003, still 11%. Large commercial operations use almost exclusively tractors, a choice that, for some applications, soaring oil prices may make suboptimal. For example, “a study in Columbia revealed that the cost per hour for direct expenses plus the cost of investment for a tractor was \$3.28 (U.S.) as against \$1.59 for a male buffalo and cart, or 50% for short distances of up to 1.2 km, a ratio of 2 : 1 (Galindo circa 1998:4-7). ... Updating Galindo’s cost data to 2005 to reflect the current cost of diesel and applying the Mozambican agricultural labour minimum wage rate (\$32/month), the ratio becomes **4.7 : 1** in favour of **animal-drawn transport!** Moreover, in an African context, with tractors 89% (i.e., \$2.89/hr) of total costs would be for imported equipment and supplies (e.g., gasoline, oil, spares and equipment) as against 19% (\$0.13/hr) for buffalo-drawn transport” (Annex Table 9) (Coughlin, Mlay and Cumbe 2006:1).

The use of modern technologies, especially agrochemicals, is also rare except among the 16% of smallholders—a fast growing segment—that are farmers contracted by large firms to produce cash crops for export, mainly tobacco and cotton. Indeed, “the percentage of households that grow cashew increased from 5% to 7%, tobacco from 2% to 4%, and cotton from 5% to 7%” (World Bank 2005b:16). Under the tobacco and coffee schemes, the farmers get inputs through loans repaid by the harvest though **half** end up with *miniscule* or *negative* net returns (Table 7) (Benfica 2005:50 and 52). The process is didactic, auto-selective and socially and economically expensive: if they do not improve, poor farmers get squeezed out and new ones begin the trial.

Export crops—mainly tobacco, cotton, sugar and cashew nuts—now constitute 5% of GDP and 6% of total exports. Major international investments have pushed the production of leaf tobacco from merely 700 tonnes in 1997/8 to 51,077 tonnes in 2002/3 with 120,000 outgrowers in Tete and Manica provinces. In Manica, the immigration, settlement and investment by more than 42 white farmers fleeing Mugabe have bolstered not only tobacco production but also a new export sector—horticulture—and the potential for growth is great though, in 2005, the sector started to experience major problems.⁵⁵ Along the Beira Corridor and in Manica province, 500,000 ha are apt for commercial horticultural production and ongoing infrastructural investments will increasingly lower transport costs and improve competitiveness (GDS 2005:84).

⁵⁴ In the south, the typical charge per 1,000 m² for ploughing by oxen is 30,000 to 50,000 Mt and by tractor, 80,000 Mt (FAO 2005).

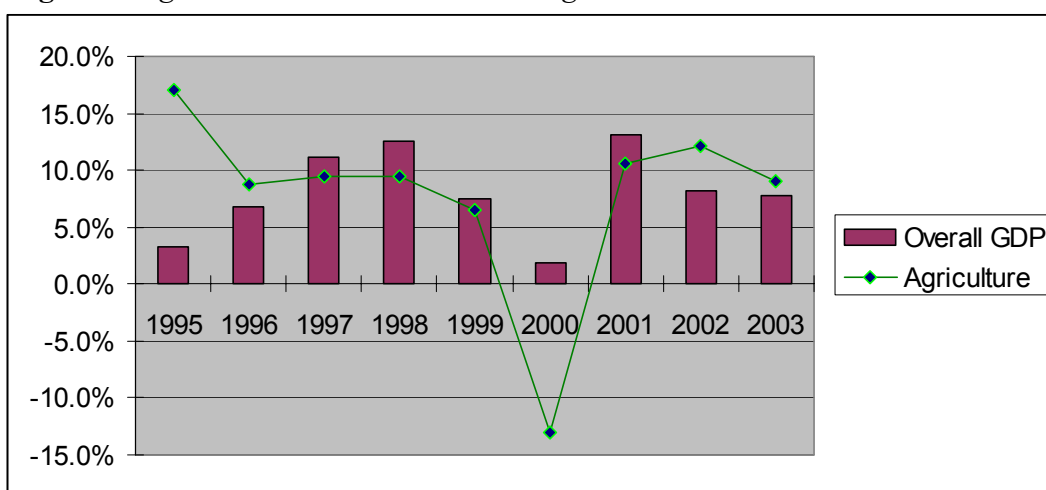
⁵⁵ In Manica, during the initial boom from 2001 to 2004, “at the peak, there were 13,500 families growing tobacco, 3,600 growing sunflower, and more than 3,000 growing paprika. Over 100 groups were organised to grow baby corn and other export vegetables”. In 2005 and 2006, tobacco prices fell while fertilizer, diesel and gasoline prices rose sharply, thus badly squeezing farmers’ margins. Now, due to these and other problems—e.g., inappropriate crops or varieties, corrupt police, inefficient courts, and lack of finance, extension and research services, and other infrastructural support—“roses are no longer exported from Manica to Europe [and] Vilmar Roses closed earlier this year. Many Zimbabwean farmers are in financial trouble and some are leaving because they cannot produce tobacco and paprika profitably. At least 5,000 full time and seasonal jobs have been lost in Manica province in the past two years. Family-sector outgrower schemes for sunflower, vegetables and other crops have collapsed [and] ... less than 5,000 families grow tobacco, and buying of sunflower and vegetables from family producers has ended” (Hanlon and Smart 2006:1).

Table 6. Annual percentage growth in production by crop, 1975 to 2002

	1975 to 1986	1987 to 2002	% of total production that is sold
Maize	-13%	15% to 20%	15% to 25%
Beans	-14%	21% to 23%	28%
Peanuts	-29%	26% to 27%	20%
Rice	-8%	-8%	6% to 11%

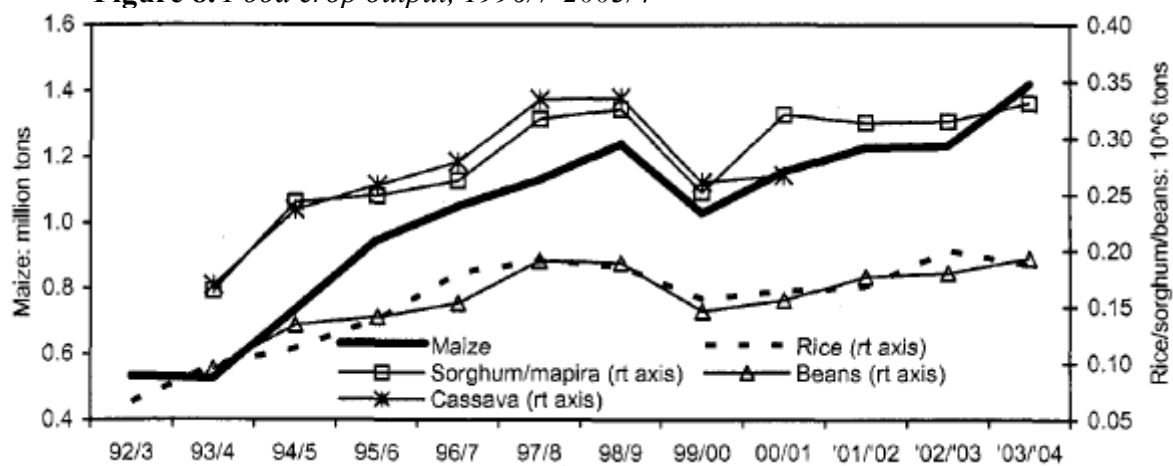
Source: MADER (2003:5)

Figure 7. Agricultural and total GDP real growth rates



Source: calculated from World Bank (2005b:16, Table 7)

Figure 8. Food crop output, 1996/7-2003/4



Source: World Bank (2005b:18)

Table 7. Net revenue/hectare for tobacco and cotton farmers in Zambezi Valley (\$US/ha), 2005

	Quartile				Total
	1	2	3	4	
Tobacco	-78.6	28.92	125.61	521.3	149.08
Cotton	-23.4	7.9	65.3	129.9	44.8

Source: Benfica et al. (2005:50 and 52)

Institutions, Government Policies, and Business Environment

Though the economy is growing steadily and inflation is moderate, Mozambique's agriculture faces serious institutional and policy deficiencies. Credit is available to merely 3% of rural households; less than 5% of rural households participate in farmers' associations; agricultural research is underfunded and inadequately focused on issues with large potential impact; and extension services reach only 14% of farmers in a given year (though the knowledge spreads to many others). Moreover, the technologies advocated are often too general (rather than location specific) and require expensive inputs beyond the reach of small farmers while also subjecting them to extreme risks in bad years (World Bank 2005b:13-14; Perumalpillai-Essex 2005:x; and Gemo, Eicher and Teclemariam 2005:60).

The process, however, of building institutions and capacity, defining strategies, and initiating, testing, and perfecting policies and the mechanisms for their implementation is historical and requires various decades to develop a mature, efficacious, and fairly efficient system. In this perspective, Mozambique—coming out of a civil war that destroyed institutions and depopulated much of the countryside—has improved quickly. In agriculture, major institutional building and reforms occurred, including a significant decentralization of resources and decision making to the provinces and districts and, recently, the creation of structures—yet to be evaluated—to make agricultural services more responsive to farmers' needs and market demands.

Institution Building, the Sector-wide Program for Agriculture, and Ongoing Reform

Peace in 1992 was the turning point. Refugees returned to farms *en masse* and institutional building and rehabilitation occurred in all sectors, e.g., transportation, health, education, agriculture. More than 1,200 largely loss-making state enterprises⁵⁶ were privatised, the big ones usually successfully, the small and medium ones, less so. Within agriculture, between 1992 and 2005, four major achievements occurred in institution building and reform:

- The agricultural extension system became operational⁵⁷ and grew into a pluralistic system involving extension workers from the private sector, NGOs and the government.
- The curriculum for primary schools changed in early 2004 and now teaches “carpentry, sewing, and various skills related to agriculture and animal husbandry”, de facto making the schools a dynamic component in agricultural education. With nearly four million “kids learning improved agricultural techniques, ... the impact—with their parents and,

⁵⁶ receiving subsidies amounting to 1% of GDP (Cramer 2001:86)

⁵⁷ Though created in 1987, the National Directorate for Rural Development was hampered by war and insufficient resources and did not become truly functional till peace came (Gemo, Eicher and Teclemariam 2005:2 and 22).

eventually, when the students have their own farms—could be great” (MADER 2004:115).⁵⁸

- A significant institutional reform, in 1999, created a five-year sector-wide program for agriculture (ProAgri I) whereby numerous donors pooled funds to support activities, build institutional capabilities, and greatly reduce reporting and other overhead expenses.⁵⁹ ProAgri II, endorsed by the ministry and originally planned to start in 2005, has been delayed though partial interim finance has been provided. To start the full program, the ministry has had to comply with donor requests for institutional and workforce reform and develop clear and agreed upon statements of priorities concerning environment, gender, and HIV/AIDS. This process is nearly completed and ministry officials expect a memorandum of understanding to be signed by the end of March or so and full financing to start in June 2006.

As designed, ProAgri II would shift much power and more than three-quarters of its budget to the provinces and districts while also setting up Multi-Stakeholder Agricultural and Rural Development Councils (“comprising representatives of other government sectors, private agricultural companies, NGOs and smallholders”) to introduce a demand-driven element into the preparation of the provincial annual activity plans and budgets (PAAOs) (MADER 2004:128).⁶⁰ Now, the concept is to avoid redundancies and, instead, to utilize existing provincial forums for this purpose though perhaps after including additional stakeholders.

- To overcome the agricultural research system’s lack of strategy and connectivity between its own organs and with the extension service and farmers, the Institute of Agronomic Research of Mozambique (IIAM) was created in 2005, amalgamating three research institutes and two centres. As planned, the new institute will also include economists and social scientists to improve the linkage with farmers and ensure that research results and

⁵⁸ Since the primary school must now teach farming and animal husbandry, the new curriculum creates scope for the extension services to assist the schools and, perhaps, the teacher training institutions. Despite the reform, the training institutes still grow little of their own food and, most commonly, greatly underutilize their model farms. Given the new curriculum, farming and animal husbandry could be part of the training while also supporting the institutes’ budgets. In 2005, the National Directorate of Extension initiated contacts with the Ministry of Education to explore how the schools and extension service might cooperate but, with the change in the government, the initiative was put on hold. With financing by FAO and cooperation from the Ministries of Agriculture and Education, a pilot project, *Projecto Hortas Escolares*,—functioning at 12 schools in Tete, 12 in Inhambane and 12 in Gaza—has nearly completed the preparation of a manual for teaching farming and animal husbandry in primary schools throughout the country. —*Sources*: interviews with Hélder Gemo, National Director of Extension Services, Ministry of Agriculture, 13/2/06; Abel Assis, Director, National Institute for the Development of Education, 6/3/06; and Hassane Rachid, Ministry of Agriculture, 21/2/06.

⁵⁹ The reporting requirements for a plethora of uncoordinated donor programs and projects can absorb huge amounts of professional time—both local and foreign—to produce disjointed, often redundant evaluations requiring diverse reporting procedures. For example, in Tanzania in 1999, donors sent “1,000 missions per year and the government was producing 2,400 quarterly reports annually to meet their requirements” (Gemo, Eicher and Teclemariam 2005:16 based on World Bank 2002).

⁶⁰ The plan for ProAgri II also foresees the creation of a Horizontal Management Board within the ministry’s headquarters (MADER 2004:129). As originally conceived, this would create demand pull to counterbalance the power and bureaucratic inertia in the vertically organized national directorates and prioritize the activities and resources across them more in accordance with clients’ needs. But as finally approved, the plan placed “representatives of central and provincial MADER” on the board (chaired by the minister) but *without any form of client representation* thus partly undermining the purpose for the distinction between vertical and horizontal organization, namely, to distinguish between service suppliers and users. As now proposed under ProAgri II, central power will remain vertical with but minimal modification. In addition to representatives from relevant ministries and two from donors, the Ministry of Agriculture’s national directors will sit on **both** the Minister’s Consultative Council **and** on the Horizontal Management Board and no plan exists to include private-sector representatives on the board.

the consequent changes in agricultural practices advocated by the extension service will consider market conditions and be profitable and not too risky for farmers.

In 2000, the government launched its *Programme for the Reduction of Absolute Poverty* (PARPA) as a strategic framework for sectoral work, including agriculture. As it evolved, PARPA shifted from a short- to a medium- and long-term focus promoting fast, widespread growth as the best way to benefit the poor (Mozambique 2001b:2). This, at least, obliged the ministries to analyse systematically how their policies and programmes affect the poor and especially women. Though sometimes perfunctory, this analysis often inspires changes to their benefit.

Since the primary school curriculum reform is recent and no evaluations exist yet, the following sections only focus on the agricultural extension and research systems while also leaving aside the structural issues of the Ministry of Agriculture, ProAgri, and the autonomous institutions such as the national cotton and cashew institutes.

The Agricultural Extension System

Initiated in 1987, the National Directorate for Rural Extension expanded rapidly after peace came in 1992 but, due to scant resources and international pressure, was “kept on hold” after 1999, capped off at a maximum of 800 extension workers, each normally serving 225 farm households (Gemo, Eicher and Teclemariam 2005:107). Nevertheless, since the system is pluralistic and 117 of the 128 districts have at least some extension workers from NDER, NGOs or private companies, it might seem that most districts are covered (Table 8). In fact, the coverage is typically quite thin with 1.3 extension workers per 10,000 rural inhabitants. Moreover, during 2002/2003, only 14% of farmers had received advice from an extension worker (Table 9).⁶¹ Though only 9.4% of villages have an extension office or post and even in those villages “only 20% of the households ... actually benefited from it”. Of all farm households, 32% acknowledge having “access to extension services” in their village (Perumalpillai-Essex 2005:8 and 18). Access? A vague, inclusive concept! Ambiguities aside, most farmers get *no* extension services, directly or indirectly.

Why? Distance is a big factor. Though “20% of villages are within 30 km of an office, ... 43.5% have more than 200 km to travel to visit an office”, an impractical distance for extension workers and poor farmers (Perumalpillai-Essex 2005:8 and 11). DNER’s extensionists use a modified train and visit methodology that is less top-down, more participatory, and flexible about scheduling visits in tune with farmers’ needs. This approach increasingly emphasizes working with farmers’ associations as being both faster and more cost effective (Gemo, Eicher and Teclemariam 2005:42). For example, during our field visit to Murrupula in September 2005, the District Agricultural Director informed us that he has seven extensionists using the modified train and visit model⁶² and seven (paid by CARE) exclusively dedicated to promoting farmers’ associations. In one year, the latter seven have set up 82 associations, which, in his opinion,

⁶¹ TIA’s estimate of 14.1% coverage corresponds remarkably well with the 17.2% estimated in Table 9 on the basis of the norm of 225 farm households per extension worker. On the other hand, Perumalpillai-Essex (2005:17) use a different and rather vague concept, *access*. Accordingly, in 2002, 32% of communities “had access to extension services over the past 12 months ... [though] only 20% of the households in villages with an extension service, actually benefited from it”.

⁶² Between 1975 and 1995, the World Bank promoted the train and visit model for extension organization in more than 70 countries. Despite being “25% to 40% more costly than the systems” it replaced, it was “intended to deal with accountability by improving management’s ability to monitor staff activities, taking advantage of the strict visit schedule, identifiable contact farmers, intensive hierarchy of supervisory staff, and other quantifiable measures. ... Several features of the design could not stand up to practical realities, however. The quality of extension services remained mostly unmonitorable, and the lack of accountability to farmers was not resolved” (Anderson and Feder 2004:49).

render benefits far beyond those achieved using the standard approach. Though community leaders typically have limited education and the associations need capacity building especially by participatory methods, they negotiate for better prices for inputs and crops, help to facilitate market access, and serve as a vehicle for the promotion of new or improved technologies such as fish ponds or the use of peddle pumps to irrigate vegetables.

Table 8. *District coverage for extension services in Mozambique, 2004*

Region	Province	Total number of districts receiving at least some extension services	Districts having at least some extension workers supplied by:		
			MADER	NGOs*	Private companies
<i>North</i>	Cabo Delgado	14	7	16	12
	Nampula	19	10	20	15
	Niassa	13	5	14	6
<i>Center</i>	Manica	6	6	6	5
	Sofala	10	9	9	0
	Tete	10	5	7	10
	Zambézia	16	6	15	6
<i>South</i>	Gaza	11	5	11	0
	Inhambane	11	6	13	0
	Maputo	7	6	7	0
Total**		117	65	111	72

Source: derived from tables in Gemo, Eicher and Teclamarium (2005:53 and 113-116) after cleansing for various errors and updating the information about where private cotton companies with extension workers are operating. This table also corrects that presented by Perumalpillai-Essex (2005:5), which showed 143 districts, i.e., more than the country has.

* Whereas the statistics for MADER only report the districts with an extension office, the NGOs count any district where they render services whether or not they have an office there.

** excluding the seven districts of Maputo City

Table 9. *Extension worker density in Mozambique, 2004*

Region	Province	Population	Extension workers			Extension workers per 10,000 inhabitants in:		Idealized coverage @ 225 households per extension worker (%)
			Gov.	NGOs	Private*	Province	Zone	
North	Niassa	966,579	58	135	68	2.7		36.5
	Cabo Delgado	1,588,741	91	183	n.a.	1.7	1.3	23.3
	Nampula	3,563,224	121	291	n.a.	1.2		15.6
Centre	Zambézia	3,645,630	55	213	19	0.8		10.6
	Tete	1,461,650	56	54	172	1.9	1.2	26.0
	Manica	1,280,829	62	71	n.a.	1.0		14.0
	Sofala	1,582,256	86	26	n.a.	0.7		9.6
South	Inhambane	1,401,216	54	95	n.a.	1.1		14.4
	Gaza	1,333,540	73	177	n.a.	1.9	1.4	25.3
	Maputo**	1,074,793	52	64	n.a.	1.1		14.6
Total**		17,898,458	708	1,309	259	1.3		17.2

Source: MADER (2004).

n.a. = not available

* Except Maputo and Inhambane, all provinces have at least some private extension workers though how many is not known.

** Excluding the population of the Province of Maputo Cidade (1,073,938)

Given its resource constraints, DNER has deliberately chosen to concentrate its efforts in high potential areas while ignoring others. The strategy is justifiable since “the global experience shows that there is a high payoff for concentrating extensionists in high-potential agro-ecologies and districts rather than sprinkling extensionists throughout the countryside” (Gemo, Eicher and Teclemariam 2005:95). Yet a problem exists. Even inside those high-potential areas many farmers receive no advice, even indirectly, from extension workers. The extension workers are simply too few to go to all the communities, villages or even nearby villages. But a choice has been made: to a great extent, even within the target districts, the extension system assists the *same* farmers in the *same* villages year after year while *permanently* ignoring others. Many farmers have no prospects of seeing an extension worker even within a decade while others have the service guaranteed year in, year out. DNER does not have a strategy to rotate every three or four years some, though perhaps not all, extension workers to previously uncovered villages.⁶³

Is this justified? Some rationale exists to keep extension workers permanently focused on particular areas within a district, especially if the remaining areas have little agricultural potential. Moreover, agriculture is dynamic and the problems in a given zone are not the same every year. Even so, most extension messages do not change year to year. The villages within the extension worker’s circuit get saturated with mostly the same messages whose marginal utility declines since, within the first years, the ready learners will have already adopted them. Though Gemo, Eicher and Teclemariam (2005:45) argue that “many of the simple technology messages are still relevant”, their prolonged repetition to the same farmers has declining returns.

⁶³ Although DNER is currently finalizing a program (financed by FAO) to expand to 93 the number of districts it serves, the problem of gaps in coverage inside the districts will persist.

A rotational system might maximize the number of households and farmer associations that will have received assistance over, say, a decade.⁶⁴ However, both this and the present strategy of permanency of geographical focus have costs and benefits. Rotation might have a larger impact than that achieved by fixing extension workers in nearly permanent circuits but it would probably increase costs for housing and transportation. Over, say, a decade, which strategy would manifest the best cost/benefit ratio? Only a prospective cost-benefit analysis would suggest the answer, an answer that would need subsequent confirmation in practice. Nevertheless, so long as the extension system is so direly short of resources⁶⁵ that it assists but a fraction of the farmers in a given district, an evaluation of alternative strategies might reveal whether and under what circumstances an alternative approach would be useful. Intermediate options could also be considered, for example, the possibility of leaving some extension staff in the original circuits to work, albeit less frequently, through farmers' associations to deal with new problems.

Ostensibly, one of the advantages of a pluralist extension system is the possibility to experiment with and learn from different approaches. In Mozambique, however, “there are **few examples** of horizontal linkages and systematic exchange of substantive experience and financial information among Mozambique's three extension providers” (Gemo, Eicher and Teclemariam 2005:97, emphasis added).

The extension system also suffers from the inadequate preparation of many of its extension workers. “The training of extensionists about high-value crops is a new challenge as most of them do not have the technical knowledge required for production of these crops; how to add value to the commodities and how to find information about prices, grades, and standard; WTO regulation; and access to regional and global markets” (Gemo, Eicher and Teclemariam 2005:74).

Another acute problem concerns the usefulness of the technologies and methods promoted in Mozambique by extension workers. For example, Eicher (2002:26) reported that “during our field visit a provincial agricultural officer reported that ‘we need new technical messages. We have preached the same messages such as planting on line for 10 years. We need messages on conservation farming, tobacco, animal husbandry, and fish farming.’” All three extension providers—government, NGOs, and private companies—suffer a “general lack of technology that is profitable to small-scale farmers on a recurring basis and at an acceptable risk” (Gemo, Eicher and Teclemariam 2005:92). Numerous sources have also argued that the technologies advocated for small farmers have been both too risky and frequently unprofitable in view of market demand and farm-gate prices (e.g., Sasakawa's maize technology kit [see p. 19]) (Howard et al. 1998, 1999, 2000 and 2001). Moreover—as Mole (2000:8 and 9) found for the technology for the chemical control of the powdery mildew disease that attacks cashew trees—to be successful, the strategies must focus not only on *increasing yields* but also on *reducing costs* while simultaneously ensuring that the messages are, indeed, appropriate for the local soil and climatic conditions.

How effective is extension work under current circumstances? Walker et al. (2004: vii and 49) argue that, in Mozambique, “agricultural extension had no measurable impact on either net crop income or livestock sales” though they later acknowledge that “households ... [that] received information from extension agents had somewhat higher (5% with borderline statistical significance) net crop income than other households” and suggest that this may, in part, be due to “constraints on access to improved inputs and to more location-specific adapted technologies”. On the other hand, Perumalpillai-Essex (2005 :48) argue, on the basis of their model, that “access

⁶⁴ Wider geographical focus would also complement the need that rural primary schools have for extension advise about farming techniques specifically relevant for their agronomic conditions.

⁶⁵ DNER is currently amending its master plan and, with major assistance from FAO, plans to extend its coverage from 66 to more than 90 districts. Even in those districts, however, only a fraction of the farmers will receive assistance directly or even indirectly.

to rural extension increases farm production by about 8.4%” largely by promoting improved seeds, natural pesticides, and soil conservation.⁶⁶ Nevertheless, by either study, the results are **low**.⁶⁷ For example, a study for Zimbabwe found that “receiving one to two visits per agricultural year raises the value of crop production by about 15%” (Owens, Hoddinott and Kinsey 2003:356).

The Agricultural Research Network

Despite some successes, the apparently low overall impact of extension services in Mozambique and the persistent complaints about the lack of profitable, low-risk and location-specific technology ready for dissemination raise questions about the efficacy of the linkages between research, extension and the market (Gemo, Eicher and Teclemariam 2005:60). For example, Eicher (2002:14) reported that, “in our May 2002 field visits to six districts, we found there was a lack of cost of production studies of present and improved technology for the family sector and a general lack of connectivity between research stations and extension programs. A number of research stations were inactive because of disbursement delays, lack of qualified staff and inadequate computer and support services.” Earlier, an evaluation by the Royal Tropical Institute found that “agricultural research is largely planned and coordinated from headquarters in Maputo. ... A consequence of this strategy with centralized planning is isolation from the producers’ reality and weak involvement of [farmers, extension workers and other] agents in setting priorities and planning research” (KIT 2000:11). The National Director of Rural Extension, himself, affirmed, in 2005, that “unfortunately the linkages between extension, research, and marketing have not improved significantly over the 1999-2004 period” and identified “three main reasons for this impasse”:

- though highly complementary, research and extension services “continue to work on their own agendas and priorities” due to the “fragmented approach to decision-making and implementing decisions”;
- “both services have serious funding and human-capital constraints;” and
- a transparent career ladder does not exist to provide “training and incentives to work a cadre of highly committed professionals in both extension and research, who are on a

⁶⁶ “The analysis finds that extension works mainly through the introduction of new crop varieties. According to the survey, 43% of respondents introduced new varieties in the last five years if they had received advice. Only half as many (21%) introduced new varieties if they had not received advice. Farmers that introduced new varieties can count on a significantly higher probability of reporting an improvement in living conditions. The extension service also works by encouraging new techniques”, in particular, by “promoting natural pesticides” and soil conservation (Perumalpillai-Essex et al. 2005:103).

⁶⁷ Various studies also examined the annual internal rate of return (IRR) from investment in extension services. A review of 27 studies in Africa revealed that 21 had internal rates of returns exceeding 12% (Oehmke, Anandajayasekaram and Masters 1997:5). A meta-review of 19 studies of the average IRR of agricultural extension yielded 80% if the unit of observation was farms and, in five studies where the focus was aggregate, the IRR was 75%. For Africa, six studies had a 90% average IRR on investment in extension and 35% for research (Evenson 2001:80). An earlier review of 11 studies in Africa revealed an average IRR of 40% for investments in agricultural technology development and transfer with most rates falling between 21% and 60% (Oehmke and Crawford 1993:5). Another meta-analysis of 281 studies between 1953 and 1997 revealed that, worldwide, “the medium of the rate of return estimates was 48.0% per year for research, 62.9% per year for extension services, 37% for studies that estimated the returns to research and extension jointly, and 44.3% for all studies combined” (Alston et al. 2000: ix).

In Kenya, Evenson and Mwabu (2001:24) estimated elasticities and found that for all crops, on average, a 10% increase in the intensity of extension efforts raised production by 1.3% and, specifically for maize, the main food crop, by 2.9%. The intensity of extension efforts was measured by the “number of extension workers per farm in a given cluster”, which presumably reflects both the extension workers’ own training and their effectiveness in training farmers (Evenson and Mwabu 2001:4-5)

particular job for long enough to develop contacts and trust with professionals in other services” (Gemo, Eicher and Teclemariam 2005:60).

Indeed, Mozambique—in the same category as Rwanda—has less than one agricultural researcher per 50,000 people economically active in agriculture whereas the ratio for Reunion, Mauritius, Lybia, Egypt, Cape Verde, South Africa, Tunisia, and the Seychelles is 1 : 2,500 or better and, for developed countries, roughly 1 : 400 (Roseboom, Beintema and Mitra 2003:68-69).

In 2002, a further complication was that, “in spite of the directives from MADER/ProAgri toward the Farm-Systems-Research approach, the public research system” still had no social scientists. “The few adaptive-research interventions done in Nampula and Niassa provinces have been dominated by teams comprised by natural scientists (mainly agronomists). The lack of social scientists results in experimental programmes based on physical parameters while little attention is given to socio-economic analyses and [a] systems perspective as well as basic costs and benefits, and return-to-investment analysis of the technologies under development” (SANAGRI 2002:8).

To deal with these problems, the government, in late 2004, consolidated a training centre and four research institutions,⁶⁸ including their regional research facilities, into the Institute of Agrarian Research in Mozambique (IIAM).⁶⁹ The Agronomy and Veterinary Science Faculties of Eduardo Mondlane University conduct mostly academically oriented research and remain independent. In late 2005, IIAM received technical assistance from Michigan State University, created a unit for socio-economic research, and recruited new specialists in recognition of the urgent need to focus its research on economically profitable options for farmers in view of the exigencies and opportunities in national and international markets.⁷⁰ Furthermore, as now structured, IIAM allows the regional research centres considerable autonomy in setting research priorities in accordance with local needs. To ensure better connectivity between the research centres and farmers and other agents in the production chain, regional forums have been set up including representatives from government, NGOs, farmers associations, and other stakeholder groups.

Land, Macroeconomic Stability, Business Environment, and Financial Services

Land policy, macroeconomics stability, and the general business environment in Mozambique significantly affect the costs and risks of investment in farms and along the entire value chain till the ultimate consumer, domestic or foreign.

⁶⁸ the Centre for Agrarian Education, the National Institute for Agronomic Research (INIA), the National Institute for Veterinary Research (INIVE), the Institute for Animal Production (IPA), and the Centre for Forest Research (CEF)

⁶⁹ “INIA comprises a network of research and experimental stations, spread all over the country, namely in Umbeluzi and Ricatla (Maputo), Chokwe (Gaza), Nhacoongo (Inhambane), Sussundenga (Manica), Nampula and Namialo (Nampula) and Lichinga (Niassa). Most of these research stations are in a very poor condition. IPA, besides [its] headquarter[s] in Matola also has experimental centres in Angónia (Tete), Chobela and Maziminhama (Maputo). CEF has head offices in Marracuene and experimental sites in Mandongue and Moribane (Manica) and Tanga (Maputo)” (SANAGRI 2002:7). INIVE includes provincial laboratories in all provincial capitals, except in Maputo province.

⁷⁰ interview with Calesto Bias, director, IIAM, 1/3/2006

Macroeconomic Stability and Business Environment

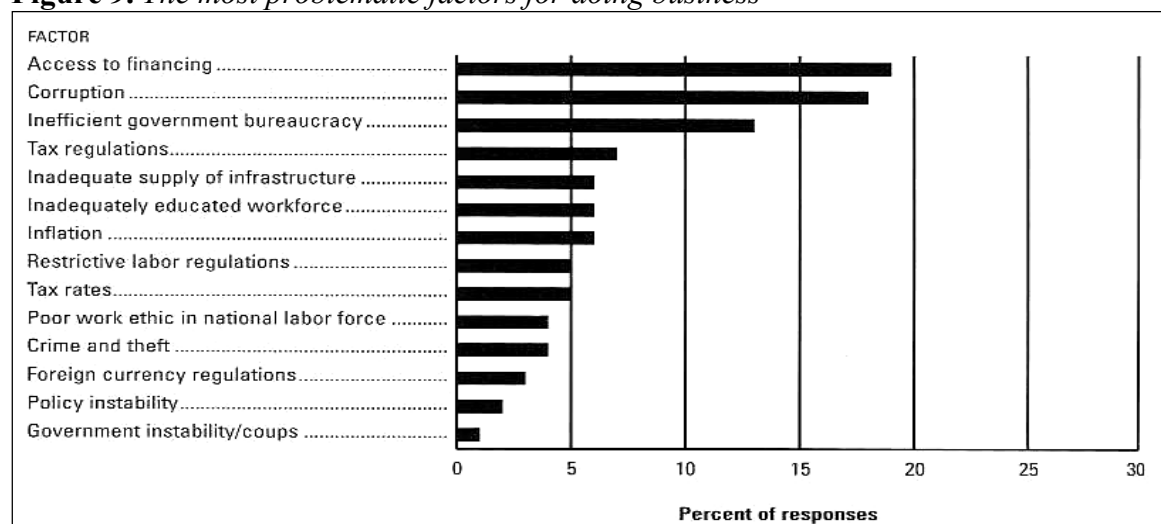
Since peace in 1992, the economy's real gross national income grew, on average, 8.1% p.a. between 1993 and 2003 and 7.2% in 2004. Annual inflation in consumer prices fell from 56.5% in 1995, averaging 12% from 1996 to 2004 and rising marginally to 14% in 2005 largely due to higher fuel prices.⁷¹ In some years, large swings in the exchange rate aggravate the risks of operations, especially for local companies with no practical way to access foreign-exchange and commodity hedge markets.

The business environment influences the desirability of investments by both agro-businesses and small farmers in agriculture and along the entire value chain from inputs to commerce and processing plus its impact on the rate of growth of the entire economy and, hence, on local demand for agricultural products. Though the *Global Competitiveness Report 2005-2006* ranked Mozambique as 91st out of 117 countries on its Growth Competitiveness Index and 95th on the Business Competitiveness Index, some aspects are fairly good. The country has little fear of a recession (rank = 33), foreign direct investment and technology transfer is deemed strong (rank = 24) as is the government's success in promoting information and communication technology (rank = 34), and, reportedly, business complaints about red tape dropped considerably (rank = 30) as the result of persistent efforts over more than a decade to simplify and speed up bureaucratic procedures (WEF 2005:383). An earlier study in 2003 found that "lack of access to and the high cost of finance were cited by 78% of the sample as large or severe. The second most often cited category was the uncertain policy environment and regulatory/administrative barriers overseen by the government" (Nasir et al. 2003:4). Despite this, KPMG's business confidence index for formal enterprises rose from 87.9 in early 2000 to 108.0 in late 2001, where it plateaued, registering 108.1 in early 2005 (KPMG 2005:6).

Businesses complain most about corruption, lack of access to finance, and inefficient government bureaucracy (Figure 9) (WEF 2005:389). For example, "export procedures can ... be burdensome. ... Exporters in Mozambique need to obtain a certificate of origin, a certificate of quality, a sanitary and phytosanitary certificate and an export license, which is needed for each transaction, before exporting. The certificate for quality and the sanitary and phytosanitary both require inspections" (Clarke 2005:10). Indeed, in 2003, it took on average 17 days to clear an export shipment (Nasir et al. 2003:5). Nevertheless, despite these difficulties, large companies set up departments to routinize the handling of bureaucratic requirements at a small fraction of total costs and use their political-economic clout to overcome any severe difficulties. Informal traders and producers and small and medium-sized companies, however, are gravely afflicted and often subject to demands for abnormal payments not only from national but also local officials. Still, despite what is in many respects an "unpropitious institutional environment", growth has been remarkably high (World Bank 2005b:xiv).

⁷¹ Central Bank of Mozambique, www.bancomoc.mz/index.php?menu=45&lang=po&id=20629

Figure 9. *The most problematic factors for doing business*



Source: WEF (2005:382)

Note: From a list of 14 factors, respondents were asked to select the five most problematic for doing business in their country and to rank them between 1 (most problematic) and 5. The bars in the figure show the responses according to their rankings.

Land

For land policy, the government has implemented legal and procedural reforms, eliminating some problems but creating others while trying to devise a system that simultaneously encourages private investment and protects communal and smallholders' rights.

The regime of rights to land in Mozambique has undergone a radical change in the last few years. The timetable of amendments to legislative instruments dealing with land issues has been rapid: a new Land Policy was adopted in 1995; the new Land Law was passed in 1997;⁷² regulations for dealing with rural land parcels were promulgated in 1998 and a Technical Annex to these regulations (detailing the methodology by which registration of community rights should take place) was passed at the end of 1999.

As finally adopted, the Land Law of 1997 carefully struck all reference to customary rights and any role for traditional or tribal authorities, who for long had been denied recognition by Frelimo (Virtanen 2004:68).⁷³ Later, however, Decree 15/2000 was issued to “establish ... ways to link local organs of state with community authorities”. Accordingly, *community authorities* were defined as “people who exercise a specific form of authority over a specific community or social group”, i.e., traditional chiefs, village secretaries, and “other legitimated leaders”.⁷⁴ Thus,

⁷² amending the Land Law of 1979, which implemented the socialization of the land announced in the new, post-independence constitution that nationalized all land concessions and private land holdings

⁷³ “When the Land Bill was finally presented to the National Assembly in September 1996, the concept ‘customary system’ was again withdrawn from the revised document, along with ‘customary law’. Devolution of power to independent local-level institutions was thus consistently prevented. The new proposal was criticised by lawyers, who noted that it allowed decentralisation of land management only in urban (planned) areas, maintaining therefore the Marxist tradition of centralised state control. This critique had little effect: in the final version, which was passed by the Assembly in October 1997, control over rural land was decentralised **only to provincial level**” (Virtanen 2004:68 emphasis added). A few years later, this changed with Decree 15/2000.

⁷⁴ Though formalised in 2000, this shift in authority had begun earlier. “In 1995, the traditional chiefs (*régulos*, *mwenes*, *cabos* and *capitães*) requested the government to restore their authority as leaders of their community with all benefits and rights acquired during the colonial period. Their authority, mainly of the *régulos*, was partially restored to include land allocation, resolution of land disputes, and authorization to temporarily use the land they

the basis has been laid for the development of land administration systems that facilitate rural development and safeguard the rights and interests of the rural poor: policy objectives and legal instruments have been put in place to ensure that the customary rights of rural dwellers are safeguarded;⁷⁵ the role of rural communities in the allocation and adjudication of land-use rights, and the right to register customary use rights are ensured by statute; simple and flexible methodologies have been designed that allow for the registration and recognition of rights to be rooted within customary knowledge and practice. Moreover, the policy is designed to encourage the development of negotiated partnerships between customary rights holders and the private sector, allowing communities to directly benefit from the use by third parties of customarily occupied land (Norfolk and Liversage 2001:2).

Another big improvement is that now,

in the case of disputes and in establishing community rights and good faith occupancy, courts **must** accept verbal evidence. This was a problem under the previous law and regulations, which gave precedence to paper titles even if they had been incorrectly issued, even when the land was already occupied by someone else. Now, evidence of occupation takes precedence (Hanlon 2004:4, emphasis added).

As a result, two systems—statutory and customary laws—exist for people get land. The private sector tends to use the statutory system while the family sector uses customary law (Tique 2002:4).

The efforts, however, to design an expeditious system with minimal delays in the allocation of land for productive purposes may have undermined the “quality of the community consultations done and the assessment of the business plans of applications” (Norfolk and Liversage 2001:11). A recent report on Cabo Delgado reveals that,

in reality, the new law has not turned out quite as well as planned. While it does defend community land rights, it has not produced the close relationships between investors and rural communities that its designers envisioned. Instead of contracts spelling out ongoing financial relationships between investors and communities, the practice of one-off (compensation) payments continues, leaving community members with a short-term flush of cash and long-term loss of their lands. ... Government officials ... sometimes ... authorize investments before communities have been consulted. While in principle the communities still have the right of refusal, in practice it becomes difficult to refuse the combined weight of both investor and government. [However,] for the present, this is not a terrible problem: there is yet plenty of land in Mozambique (Bechtel 2001:12).

Local practices and legal theory are not always consistent either. For example, in Zambézia province, land rights registration has motivated the emergence of numerous new community-level institutions that have

cultivated during the colonial period. They had preferential access to land which, in general, they divided among themselves, taking the large and most fertile parcels” (Tique 2002:4).

⁷⁵ “All land used by local communities (including grazing lands and forests) was defined as community land, with immediate effect. No processing or documentation is required (though it is advised in the case of land in areas of potential conflict). The burden of proof lies on the outsider to prove that he is not occupying land against community will. [Moreover,] community land is held in common and can only be occupied or sold by outsiders through recognised public consultation processes in the presence of relevant officials (the *Auto de Consulte Comunitário*)”. Persons who have occupied a piece of “land in good faith for more than 10 years” should “receive a land use title by right of occupation”. Local or foreign investors may receive land for business purposes on long-term renewable leases but only after a series of mandatory community consultations designed to ensure that “community lands are not occupied against community will”. And, finally, within certain limits local authorities may grant people land-use rights (Bechtel 2001:8).

delimited their acquired land rights and established community-level management systems. ... The new communities have registered large swathes of land, but have had a limited impact on development processes. They are not yet recognised by the state as legitimate actors in planning land and resource use, adjudicating disputes, or allocating rights. ... Existing institutions, in the form of traditional authorities or local government structures have largely maintained their roles and legitimacy even in areas where delimitation processes have resulted in the advent of new management institutions. ... The new community groups face a dual challenge: from the state, which is reluctant to deal with the full implications of policy objectives geared towards devolution of powers and control over land, and from their own constituents, who are familiar and largely respectful of the traditional mechanisms that exist within their communities (Norfolk, Nhantumbo, Perira and Matsimbe 2003: Abstract and 19).

Since, in most localities, land is not scarce, smallholders feel little urgency to obtain a land title and, in 2000, only 3.9% had one. By contrast, 100% of the large farmers and 16.3% of the medium-scale farmers possess at least one title (Annex Table 2).

Another serious problem remains. While the revised law empowers communities to negotiate for schools, roads, health clinics, dams, jobs, and cash from agro-businesses that want right of access to their land, the negotiating power of the two sides is hugely asymmetric. The companies typically have negotiators with better skills and information than do cash-strapped farmers and community leaders. Plus there is the lure of corruption. Moreover, though the law requires that communities be consulted and must agree to any occupation of their lands, these procedures are sometimes rushed to the extreme.

Although consultations are supposed to involve two separate meetings, most seem to have been cursory and just a single meeting, with some as short as 20 minutes, and poorly recorded. Maria da Conceição de Quadros, director of the Technical Secretariat of the Inter-Ministerial Commission to Revise the Land Law, notes that some consultation exercises have been “rudimentary in the extreme. Cases have been recorded where cadastral teams go to the district in question, quickly inform the community, and gather together the three to nine signatures needed. In just a few hours the future of significant land resources is decided for the next 50 or 100 years” (Hanlon 2004:608).

But the picture is mixed. Some consultations have been exemplar while others have brought minuscule cash payments (\$1 per hectare) and continued poverty compounded by high benefits for community leaders, tiny payments for other farmers, and suggestions of corruption (Hanlon 2004:608).⁷⁶ “Since the system of acquiring land rights lacks transparency and allows the well-connected to obtain large holdings at virtually no cost, rent-seeking behaviour is encouraged.” Consequently, “many of the concessions are underused.” To discourage this, the World Bank advocates a big increase in land taxes while simultaneously eliminating the requirement for land-use plans and the corruption and delays that they excite (World Bank 2005a:73-75).

Financial Services

For rural areas, both savings and credit facilities are largely absent, especially for small farmers. Only 2.9% of rural households have access to credit and this nearly always comes from the concessionaire companies managing large cash-crop schemes.⁷⁷ Mozambique’s banks lend

⁷⁶ Though Hanlon (2004:617) observes that “the way in which the law is being applied is improving rapidly”, he argues that “four linked problems remain: land grabs by the Mozambican elite, extensive corruption throughout the justice and administrative systems, a lack of clear rules for some procedures, and a lack of skills and experience at the level of the peasantry”.

⁷⁷ The concessionaires’ and merchants’ input credit schemes are discussed on pages 13 and 21.

only 10% of their portfolio to agricultural activities and little or nothing to smallholders (Nathan Associates 2004:10-9). “A number of funds ... provide a specific financial product to a selected target group of rural entrepreneurs”, and some micro-credit initiatives exist for the rural areas. Nationwide, “about 30 micro-financial institutions are operating, from which World Relief International, CCCP, CARE, Tchuma, SOCREMO, and Novo Banco are considered the major ones” though only about 18% of their credit goes to agriculture (Varajidás 2005:10). However, “all these initiatives are strongly subsidy dependent, their impact is very small, and long-term sustainability is questionable” (van Empel 2001 cited by Bias and Donovan 2003:85). For savings and credit cooperatives, the absence of any national insurance fund to protect members’ deposits against bankruptcy also hampers their expansion.⁷⁸

In rural areas, handling or keeping cash is often risky. Since few rural districts have a branch bank, farmers, especially cash-croppers, risk assaults and theft after receiving large cash payments for their harvests (*Notícias Economia e Negócios* 7/4/06:4-5). And, pathetic anecdotes tell of hoarded notes eaten by insects or consumed by flames.

Gender and HIV/AIDS

In the countryside, women are disadvantaged in education, assets, income, and the incidence of HIV/AIDS. Despite big improvements over the last 15 years, girls still go to school less and for fewer years than boys (Table 10). In 2003, of all eligible children, 58% of boys and 53% of girls entered primary school but 53% of the boys progressed to 5th grade while only 45% of the girls did. For adults, the literacy rate was 62.3% for men but half that, 31.4%, for women and, for youths 15 to 24 years old, 76.6% for men and merely 49.2% for women.

Table 10. *Primary school enrolment and completion rates (%)*

	1990	2000	2003
<i>Net primary school enrolment rate</i>			
Male	51	58	58
Female	39	50	53
<i>Progression to grade 5 (% of cohort)</i>			
Male	37	56	53
Female	28	47	45

Source: <http://devdata.worldbank.org/genderstats/genderRpt.asp?rpt=profile&cty=MOZ,Mozambique&hm=home>

Of farm households, 25.7% are female headed. But, due to customary practices, women—especially widows—have difficulties in receiving, defending and keeping their land. “Widows have been in a particularly insecure position and, if childless, have been required to leave their ‘marital’ land and return to the home of their parents. The same holds true for divorced women” (Norfolk et al. 2003:15). Also, in some areas, only male children inherit land though the 1997 land law expressly allows women to own rights to land and states that “rights may be passed to heirs, regardless of sex” and “inheritance procedures cannot discriminate by sex” (Cambaco 2002:2 and 4; Hanlon 2004:4). Nevertheless,

according to ... [customary] norms, men have privileged access to and control over land, through inheritance [and] they have greater security of land tenure at [the] household level. Customary norms are changing, however, through increasing pressure on the land, land

⁷⁸ For several years now, Tchuma, Lda., and others have been lobbying the government to create such an insurance fund to facilitate the promotion of savings and loan cooperatives.—Source: interview with Gildo Lucas, CEO, Tchuma, Sarl., 10/4/06

conflict, and the emergence of a land market. The capacity to access new and fertile land is increasingly linked to the ability to pay and to mobility. In both these respects, it would further seem that men are advantaged relative to women (Tique 2002:6).

Generalizations, however, are dangerous: practices vary greatly up and down Mozambique as does the security of women's land tenure.⁷⁹ Still, the local authorities, land committees, and elders are typically men who, by custom, may be gender biased in interpreting women's land tenure rights. Moreover, the issuance of titles is proceeding and, elsewhere in Africa, this has often been interpreted as **weakening** women's claims to land. Where "the introduction of modern forms of property titling ... is accompanied by individual registered title, women have often lost what claims to land access they had while male claims have been made stronger" (Whitehead 2006:51 based on Lasstria-Cornheil 1997 and MacKenzie 1990). Nevertheless, at least in Manica province, "initial research into the impact of the delimitation processes on the position of women suggests that things have not changed significantly" (Norfolk et al. 2003:15). That, however, is a *preliminary* conclusion based on few interviews and should be read cautiously.

Incomes, especially from cash crops, are also tilted along the gender line. For example, cotton growing and the boom in tobacco have benefited disproportionately few female-headed households. For these cash crops, the incidence of female-headed households is

much lower among cash-crop growers [than for non-growers]. ... In tobacco growing areas, ... only 4.2% of grower smallholder households are female headed, against 15.6% among non-growers. In cotton growing areas, 5.4% of grower households are female headed and 9.4% among non-growers are female headed. These statistics may be an indication that female-headed households, especially in tobacco growing areas, are not reaping the benefits of the cash cropping boom of recent years. ... Other characteristics associated to those particular households, such as size ... [and] access to productive resources ... may be behind their ... lower participation in cash cropping in the study region (Benfica et al. 2005:12)

Growing tobacco or cotton also seems to reduce the attendance of children in school. For example, for tobacco growers, 59.5% of their children attend school whereas, for non-growers, 69.4% do, and, for cotton growers, 64.2% of their children attend school whereas, for non-growers, 74.7% do, i.e., a **10% point drop in school attendance** for the children of growers of either crop (Benfica et al. 2005:11). Missed school days were also more among growers than non-growers. Though that research did not distinguish between boys and girls, it seems likely—given experiences elsewhere—that the burden of dropping out of school falls disproportionately on the girls. Moreover, evidence from elsewhere in Africa indicates that, for male-headed households, the income from cash crops, albeit produced jointly with women, is usually **received by the man**, intensifying the dependency and vulnerability of the wife (or wives) and children (Whitehead 2006:13; Warner and Campbell 2000:1330).

Another form of discrimination is institutional. Whereas, by and large, men tend cattle, women tend small livestock. Currently, the extension system focuses on cattle owners, mainly men (World Bank 2005b:xi).

HIV/AIDS also afflicts farmers and the systems that serve them. HIV prevalence has risen from 3.3% in 1992 to 16.2% in 2004. "Of the 1,258,000 adults living with HIV, 62% are women. The gender disparity is even more striking within the age group of 20-24 years where women

⁷⁹ In Nampula province, Kanji et al. (2004:11) found that "most women, in our sample of 45, inherited or were allocated pieces of land from their own families. This gives women important basic security. We also found that women tended to marry more than once and are extremely mobile in their marriage arrangements. In this context, their land provides women with a constant and important source of security. However, some situations can endanger this security: firstly, when women move to their husbands' village after marriage, and secondly, when land is subdivided and more powerful actors (local leaders, companies) buy it or simply take it over."

living with HIV outnumber men by three to one” (MacEwan 2004:vii). Women tend to get the disease and die faster than men.

According to TIA 2002, “4.2% of households suffered the death of a prime-age adult from January 1999 to September 2002, most of which were due to illness, while another 2.7% of households had a prime-age adult currently suffering from a prolonged illness during 2001/02” (Mather et al. 2004:6). Presumably, most of these cases were due to HIV/AIDS. Due to the slow commencement of the disease and its high prevalence in many provinces, the incidence of families struck by AIDS morbidity or deaths is likely to increase over the next three to 10 years (MacEwan 2004:11). However, since the affected families tend to bring in additional prime age adults and use other coping strategies, “at this stage in the evolution of the epidemic in Mozambique, not all [such] households ... are necessarily worse off with respect to labour availability, income, and cultivation rates, than non-affected households” (MacEwan 2004:viii, xi, 6).⁸⁰

Still, the impact is diverse, immense, and costly.⁸¹ For example, in 2004, there were about “228,000 maternal orphans (0-17 years) due to AIDS”, i.e., a quarter of all orphans, and “by 2010, there will be 500,000 maternal orphans” due to AIDS (MacEwan 2004:8). Indeed, the epidemic has “multi-sectoral impacts and will threaten the progress that Mozambique has already made towards poverty reduction” (MacEwan 2004:12). Consideration of all these effects is not within the scope of this review. Below, we focus upon the impact on supporting institutions and traditional seed selection and preservation systems.

The HIV/AIDS epidemic severely affects the research, extension and other institutions that serve farmers. Just in the Ministry of Agriculture, “between 1,800 to 2,400 staff (or 17%) have already been infected. ... If this ... trend continues, the number of infected staff may reach 3,300 [to] 3,700 in 2,010. The ministry ... could loose approximately 1,700 staff due to HIV/AIDS which, in turn, represents a loss of about \$13 million in terms of investments ... [for] training and capacity building” (World Bank 2005b:115).

In Mozambique, most of the seed that farmers use is selected from the prior harvest and stored for the next season. Women select the seed in a meticulous three-stage process and men build the granaries or other storage facilities. “This requires a body of local knowledge on seed selection and conservation that has been built up and adapted over the years and passed down from one generation to the next”. This meticulous process, year after year, “has contributed to the development of seed types well adapted to the local environment” (Waterhouse 2004:23-24).

Now HIV/AIDS and donor aid threaten that knowledge system.⁸² AIDS kills off the women who embody these knowledge systems often before they pass the knowledge completely on to their children. In Chókwè, research results “suggest that HIV/AIDS affected households, especially those households caring for orphans, experienced constraints in access to seed and seed information” (Waterhouse 2004:35). The evidence, however, is not conclusive. These knowledge systems may well be sufficiently resilient to permit families that partly lose that

⁸⁰ Perhaps surprisingly, the “median cultivated area per adult equivalent is **similar** for most affected and non-affected households (with the exception of female-death households in the centre and north). ... [This] suggests that, although the amount of land allocated for staple and cash crop production may have fallen for some affected households, it didn’t fall more than what might be expected given that affected households have lower adult equivalents (and thus lower consumption requirements)”. Moreover, “while the welfare indicators of many affected households are **similar** to those of non-affected households, only in the centre region ... [is] a rather large percentage of affected households worse off in terms of *ex post* income *per capita* than their non-affected counterparts” (Mather et al. 2004:10 and 11, emphasis added)

⁸¹ “A modelling approach indicates that the advance of AIDS reduces per capita GDP growth by as much as 1% per annum because of reduced productivity growth, reduced human capital accumulation, and reduced physical accumulation, not to mention the dramatic social burden of the disease” (World Bank 2005b:xvii).

⁸² Since genetically modified seed varieties are, as yet, hardly used in Mozambique, such issues are not discussed here.

knowledge to retrieve it from relatives, neighbours or even nearby villages. Still, a generational gap *is* becoming evident. For example, a study in Chókwè revealed that “younger adults interviewed for the study grew a narrower range of crops than their elders and were less able to identify traditional farmer varieties” (Waterhouse 2004:24).

“The practice of mixing own seed with seed sourced from outside” also modifies the farmer traditional varieties (Waterhouse 2004:24-25). Seed aid donated during crises contributes greatly to this dilution and homogenization. This threatens the advantages peasants seek in order to mitigate risks by maintaining a variety of seeds suitable for local environments and useful for diversification. Repeated crises and distribution of donor seed—often hybrid or improved varieties “best suited for irrigated systems”—erodes the “resilience of local seed systems, partly through erosion of local knowledge” (Waterhouse 2004:26 based on Dominguez and Jones 2003).

Geo-Political and Economic Environment

A small, underdeveloped country in the midst of the international march toward liberalization, Mozambique confronts global tendencies for tariff reductions, removal of non-tariff barriers, and both regional and international trade liberalization embodied in diverse agreements plus pressures to sign trade agreements with the EU and the US. In all this, there are strategic and tactical choices of great relevance to the country’s agricultural and agro-industrial development.

A regional strategy is insufficient. Though clearly important, the South African market is just too small to serve as a significant regional growth pole (Lewis, Robinson and Thierfelder 2002:40). “The fact that South Africa is a *large exporter* to SADC, but a *minor importer*, suggests that complementarity is low between South Africa and the rest of the SADC region” (Chauvin and Gallier 2002: 21 and 23). With poor complementarity and high transport costs, scant prospects exist that South Africa’s imports from SADC countries will grow rapidly. For the needs of the South African market, those countries—and certainly Mozambique—produce insufficient variety and quantities.

Serious, fast agricultural growth depends on investment, technology and *international* market access. Strategically that means focusing on:

- creating a gamut of legal, administrative, financial, educational, institutional and infrastructural measures to facilitate investment in agro-industrial value chains;
- studying and strategically investing in infrastructure, complementary institutions, and perhaps risk capital to encourage the development of **entire value chains** from farmer to agro-processor for products with a competitively viable potential;
- identifying, selecting and protecting infant industries that have a reasonable chance of becoming robust and internationally competitive within an historically reasonable period of time, which, depending on their complexity, could range from three to 15 years; and
- pressing in international negotiations for the abolition of tariff and non-tariff barriers, including the relaxation of rules of origin, to facilitate access to international markets (Ernst & Young and EconPolicy Research Group 2005).

Tariffs and Tariff Quotas

For developing countries, tariffs and tariff preferences are quickly losing their relevance. A series of agreements through GATT and, later, the World Trade Organization (WTO) have pressed for liberalization while a plethora of bilateral and multilateral free trade agreements, economic partnership agreements, customs unions, and common currency areas have slashed tariffs and reduced the costs of customs procedures. With few exceptions, the WTO’s

Generalized System of Preferences, the Lomé/Cotonou Agreement, and the Everything But Arms eliminated tariffs on essentially all exports to the European Union from 48 less developed countries, and the Africa Growth and Opportunity Act did likewise for the United States.

Soon tariffs will be dead. Already, except within SADC, Mozambique faces zero tariffs on the vast majority of its present or potential exports. And now that the second, back-loaded phase of tariff reductions has begun under the SADC Protocol, even those tariffs will fall to zero over the next six years. A similar process is occurring in Comesa, the East African Union, and many other regional groupings, which at some point will be natural negotiating partners for the SADC states that are not already members of those groups. Indeed, within sub-Saharan Africa, the quilt of regional groups is so overlapping that, at times, the commitments are contradictory (Figure 15 and Annex Table 8). Mozambique is the only country belonging to merely one group though it has signed various bilateral trade agreements with other SADC countries, e.g., with Zimbabwe in 2004 and Malawi in 2005.

Preferential tariff quotas, though still prevalent, will also be eliminated.⁸³ Textile quotas died on 1 January 2005, and, for the least developed countries (including Mozambique), the EU's Everything But Arms Amendment freed an additional "919 agricultural products (tariff lines at the HS 8-digit level) ... from ad valorem or specific tariffs and import quotas. At present, agricultural products such as fruits and vegetables, meat and dairy products are granted 'duty- and quota-free access' to the EU market", and sugar will enter freely in 2009 (Huan-Niemi and Kerkelä 2005:6). The Africa Growth and Opportunity Act, passed by the US Congress in 2000, also grants African countries tariff- and quota-free⁸⁴ entry of nearly all exports to the US if they fulfil certain political, legal and bureaucratic conditions. In other countries, *thousands* of other tariff quotas—though still in force, especially for agricultural products—are being phased out or made irrelevant as tariffs and tariff differentials shrink. Nevertheless, especially for agriculture, tariff quotas—despite their scheduled demise—remain a major hindrance to agricultural exports from developing countries. For example, the US applies tariff quotas—combined with high most-favoured-nation tariffs—"to imports of beef, dairy products, sugar & some sugar products, peanuts, tobacco and cotton. ... [In total,] the US applies over 1,000 quotas to "45 countries, including 37 WTO members" (Sandrey 2004:21-22).

With tariff walls collapsed or falling, production subsidies, export subsidies (including tax concessions), rules of origin, technical barriers to trade, sanitary and phytosanitary regulations, and other non-tariff barriers are the **next line of defence** for special interests in developed countries and even within regional trade groups among developing and semi-industrialized countries, e.g., SADC (Figure 10). This is especially applicable for agricultural commodities and processed or semi-processed foods. Formidable, the political resistance has caused two WTO ministerial conferences (Cancun [2003] and Hong Kong [2005]) to fail to gain significant agreement on agriculture, the negotiations with the most intense resistance by developed countries and the promise of huge gains for most—but not all—developing countries.⁸⁵

⁸³ "The extensive use of tariff quotas in agriculture as a replacement for quantitative restrictions originates with the Uruguay Round's Agreement on Agriculture in 1994. At the end of 1999, over 80% of tariff-quotas notified to the WTO were in five categories of products; fruit and vegetables, meat, cereals, dairy products, and oil seeds" (Ferrantino 2006:31). "Tariff quotas are not considered quantitative restrictions because they do not limit import quantities. One may always import by paying the over-quota tariff" (Skully 2001:1).

⁸⁴ except for a very high cap on garments

⁸⁵ While, on average, developing countries lose from non-tariff barriers, some realize large gains. To illustrate, for sugar, though "there are no gains to southern African countries into the US, Mauritius (nearly \$200 million), Swaziland (\$75 million), and Zimbabwe (\$25 million) are three of the six main beneficiaries from access into the EU market. A report for the IMF estimates that sugar exports from Mauritius to the EU from 1997 to 2000 were on average about 90% above the world price, with the resulting economic rents on average 5.4% of GDP and up to 13% in some years" (Sandrey 2004:39-40).

Figure 10. Listing of non-tariff measures by country

NTM	Country				
	EU	US	Japan	Switzerland/Norway	Mercosur
Customs procedures				●	●
Export assistance	●	●			●
Import licences				●	●
Import quotas	●	●	●	●	
Labelling	●				
Production subsidy	●	●	●	●	●
SPS requirements	●	●		●	●
Standards					
State trading			●		
Trade remedies	●	●			●
	Korea	Canada	Israel	India	Australia
Customs procedures				●	
Export assistance					●
Import licences			●	●	
Import quotas	●	●	●		●
Labelling					
Production subsidy	●	●	●	●	●
SPS requirements	●			●	
Standards	●				●
State trading	●	●	●	●	●
Trade remedies	●	●	●	●	●

Source: Sandrey (2004:46)

The values and interests involved are immense. Just the direct subsidies paid to farmers in 2002 by the European Union, the US, and Japan averaged 18.1% of the farm gate prices (Table 12). Sugar is the worst example.

The global sugar market is (along with rice and dairy) one of the three most distorted markets internationally. The disruptive policies of the EU, the US, and Japan cause most of the problems by heavily subsidising their producers. In 2000, the world reference price for sugar was around \$220 per tonne, but the US, EU and Japanese producer prices were around \$410, \$510 and \$800 per tonne, respectively. These levels of protection are made possible by domestic support in all three areas, limited quota access and very high out-of-quota tariffs to maintain these regimes. Accentuating the problems for competitive producers are the export subsidies that the EU uses to sell surpluses onto remaining free-world markets.

If the US, EU and Japan fully liberalized the sugar market by 2012, the world price of sugar would rise by about 63%, from \$185/t to \$301/t (CIE 2002:4). “Meanwhile, ... suppliers who have preferential access into the EU and US markets ... obtain economic rents for their limited exports. The EU has import quotas of 1.78 mt, while the US has a lower quota of 1.2 mt. Japan does not allow ... preferential access. ... The value of these economic rents to be almost one billion US dollars annually; \$300 million from the US annually and \$560 million from the EU (Sandrey 2004:39-40).

Of this, Mozambique has a small bite. In 2001, it exported 8,331t to the EU and by 2004/5, 27,603t (6,000t under the preferential quota), a quantity scheduled to rise further till 2009.⁸⁶ At

⁸⁶ Source: the LDC Sugar Group Website, www.ldcsugar.org

that point, producers anywhere, including non-ACP⁸⁷ less developed countries,⁸⁸ will be able to export sugar to the EU while the EU intervention price is scheduled to fall 39% to 319.50 euros in 2009-2010. The international price, however, will probably rise substantially with the demise or curtailment of inefficient ACP producers who, till now, survive and export only because of the artificially high prices they receive for quota sugar (FAO 2005:7 and Castel-Branco et al. 2004:124) (Table 11). Moreover, given the ruling of the WTO Appellate Body in April 2005, EU sugar producers will have to phase out their exports, which constitute nearly one-sixth of world sugar exports.⁸⁹

With this ruling plus the phase-out of various subsidies for EU sugar producers, the international market will suffer a major reorganization. High-cost exporters will have to cut costs and diversify or, failing that, die off or recoil into protected national markets. Though many LDCs would lose, “a few efficient sugar producers will be the winners if the current regime is entirely liberalised for all countries” (Huan-Niemi and Kerkelä 2005:14). For example, the Mauritian sugar industry, which exports half a million tonnes of sugar p.a. to the EU, stands at about 81% of the EU cost of production and may well disappear as an exporter of raw and refined sugar (Figure 11).⁹⁰ At present, Mauritius holds 38% of the EU preferential sugar quota (Hoekman 2004:20).

Table 11. *Changes in world sugar prices from different types of trade liberalization (scenarios (% change from base))*

Study	Trade liberalization scenario				
	Developed countries only	US only	EU only	US and EU combined	Multilateral liberalization
Beghin et al. (2003)		13.2			
Elobeid and Beghin (2004)					47*
Koo (2003)		32.8	21.6	68.2	
Wohlgenant (1999)	10				43.2 (7**)
Devadoss and Kropf (1996)					9**
Sheales et al. (1999)		17			

Source: FAO (2005)

* Elobeid and Beghin (2004) use the same model as in Beghin et al. (2003).

** simulation of Uruguay Round only.

⁸⁷ Africa-Caribbean-Pacific

⁸⁸ Under the ACP/EU Sugar Protocol of the Cotonou Agreement signed in June 2000, the EU agreed to import 1.3 million tonnes of sugar from the protocol's 19 ACP signatory countries and, using the Special Safeguard Provisions of the Uruguay Round Agreement on Agriculture to exclude nearly all imports from non-ACP countries (Huan-Niemi and Kerkelä 2005:6).

⁸⁹ “In 2003, Australia, Brazil and Thailand challenged the legality of the EU Sugar Regime under WTO rules. They argued that the EU's officially unsubsidized export of sugar exist only because of the high ‘intervention price’ guaranteed to domestic producers under the Common Market Organization. They also argued that this quantity included the 1.6 million tones currently imported from ACP and India under the Sugar Protocol. The WTO Panel upheld both complaints and this ruling was confirmed by the WTO Appellate Body in April 2005. The ruling of the WTO panel means that the EU would need to reduce its import tariffs resulting in the phasing out of the export of some 5.1 million tonnes of sugar” (Mauritius 2005:1). And that data is old. By 2005/6, EU sugar exports had **risen** to 7.1 million tonnes, i.e., nearly 15% of world sugar exports. Source: www.fas.usda.gov/http/sugar/2005/November/November%202005%20PSD.pdf.

⁹⁰ “The current costs of production ... are such that Mauritius will not be able to be a cost competitive supplier in the new market environment. Unless the costs of production in the sugar industry are substantially brought down and other avenues explored through rapid diversification within the sugar cane cluster, the Mauritian economy will face a catastrophic situation” (Mauritius 2005:2). Accordingly, Mauritius has devised an *Action Plan 2005-2015* to consolidate factories, reduce production, cut costs significantly, and reorient the sugar industry to utilize its by-products better, divert more than half the output to produce specialty sugars, and switch by planting energy cane and fuel cane to produce power alcohol for local consumption, thus slashing exports of raw and refined sugar (Mauritius 2005:2 and Lincoln 2006:66).

Will Mozambique's sugar industry survive? The answer depends on projected costs and these vary significantly between sources. Huan-Niemi and Kerkelä (2005:1) report that, after rehabilitation, Mozambique's sugar industry appears to be the fifth cheapest out of a list of 32 producers (Figure 11). This agrees with FAO's estimated steady state ex-mill costs of \$171.90/t after rehabilitation of the mills (FAO 2000:13). But LMC's recent strategy for Mozambique's sugar industry reports that, at present, the industry's f.o.b. costs are high (\$361/t) and that, even with major investments, will remain significantly higher (\$244/t) than the lowest cost international producer, Brazil (\$140/t) and 63% higher the projected world market price of \$150/t f.o.b. Mozambique (LMC 2006b:36, 50 and 52) (Table 13).⁹¹ Moreover, LMC's main report expects that, after liberalization, Brazil, the world's lowest cost sugar producer, will expand rapidly and supply most of the world's incremental demand for sugar (LMC 2006a:20).⁹²

The numbers and, hence, the strategy need an urgent and detailed verification. The validity of the strategy and Mozambique's posture in international commercial negotiations turns on the answer. Should Mozambique join high-cost LDC sugar producers to argue for an extension of the quota regime to 2019? *Yes*, if Mozambique will remain a low-medium cost producer. But, if it can become a low cost producer through expansion and modernization, the answer is far more complex and, in a multi-price world, depends on assumptions about prices, market access, and the speed with which Mozambique can expand output.

The LMC report assumes that, after the expansion, Mozambique would be able to sell **any** and **all** excess sugar to EU buyers at the intervention price, which, though reduced, would continue to be much higher than the international price.⁹³ Given the EU's sugar market safeguard clauses and the pressures for Doha Round negotiations on agriculture to phase out agricultural production and export subsidies by either eliminating or converting them into limited and completely decoupled Green or Blue Box supports⁹⁴ (Swinbank 2005:8 and 12),⁹⁵ this is a problematic

⁹¹ In 2005/6, Brazil supplied 38.2% of global sugar exports, up from 27.7% in 2001/2. *Source:* www.fas.usda.gov/hp/sugar/2005/November/November%202005%20PSD.pdf.

⁹² While recognizing that the recent surge in international petroleum prices will create "strong demand for fuel ethanol in Brazil will limit the quantity of sugarcane available to produce sugar and, hence, exports", LMC (2006a:23) assumes—questionably—that this is a short-term phenomena.

⁹³ According to LMC (2006b), "from 2009/10, access to the EU under the EBA arrangement will become unlimited, and the entire production surplus can be shipped under the EBA arrangement. For the purposes of this analysis, we have assumed that EU reform adopts the path proposed by the Commission in July 2004. ... With large price cuts, it is highly **unlikely** that the LDC group of countries would pursue a voluntary restriction on quota access. EBA access, therefore, will be **unlimited** [after July 1, 2009], and Mozambican access will be limited only by its productive capacity" (p.42). "Assuming the EU price is remunerative for Mozambican sugar, and offers higher returns than the world market, **all surplus sugar** produced in Mozambique, after fulfilling domestic and preferential quota obligations, will be sent to the EU. We expect this volume to range from 170,000 to 330,000 tonnes in 2012/13, depending upon total Mozambican output" (p. 41). Chaplin and Matthews (2005:5) note, however, that "under the transitional system of tariff rate quotas (TRQs), refiners must pay a minimum purchase price for these imports equal to that paid to raw sugar imported under SPS [Special Preferential Sugar]. This is in order to achieve equality with sugar providers from ACP and SPS countries. However, the EBA scheme does **not** actually **guarantee** prices for this sugar imported under TRQs (EC, 2004b). That is to say, the price that the EBA imports receive has not been guaranteed by the EU although it has itself decided to set a minimum price which the refiners pay."

⁹⁴ To be classified as Blue Box support, Annex 2 (para. 6b) of the Agreement on Agriculture requires that income-support payments be *completely decoupled* from the level of production, i.e., that "the amount of such payments in any given year shall not be related to, or based on, the type or volume of production (including livestock units) undertaken by the producer in any year after the base period". (For further explanation of the amber, blue and green box requirements, see Annex Table 10, p. 72.)

⁹⁵ According to the Council of the European Union's explanatory addendum for the *Regulation on the Common Organisation of the Markets in the Sugar Sector* 5588/06, "if in any given year from the marketing year 2008/09 onwards, sugar imports into the Community from a third country under the EBA arrangements increase by more than 25% in comparison with the imports from that country in the previous marketing year, the Commission will

assumption, which, if wrong, would jeopardize the validity of the LMC's analysis and strategy. True, the

EBA will allow unrestricted duty-free access to the EU market for sugar produced in LDCs by 2009. These imports are currently subject to a separate regime of quotas. EBA benefits least developed ACP countries with no previous allocation under the Sugar Protocol. It is likely to reduce imports from Sugar Protocol holders because it will not be possible to increase sugar imports from LDCs without reducing some combination of EU production, Sugar Protocol quotas, or guaranteed prices (Gillman, Hewitt and Page 2005:37).

Undermining this concession are the EU's negotiations of Economic Partnership Agreements and granting preferential market access—including for sugar—to various groups of ACP countries, which will likely demand similar duty- and quota-free access to the EU market (Chaplin and Matthews (2005:8). Nevertheless, the current legislative proposals envisage that “the EU sugar regime will be prolonged until the end of the 2014/15” with no review of prices and quotas in 2008 though the institutional support price net of restructuring amount for EU sugar would be cut in two stages by 39% by 2009. Accordingly, EU sugar imports from EBA least developed countries, including Mozambique, are projected to soar from 200,000t in 2005 to 2,200,000t in 2012/13 (Commission of European Communities 2005:8 and 16). Simultaneously, the US is rapidly setting up free trade agreements with various regional groupings thus diluting the benefits conceded African countries under AGOA.

With the seemingly inexorable pressures for liberalization and the elimination or dilution of preferential prices for sugar from LDCs, the strategy is perched precariously on vulnerable assumptions. It depends on external preferences and a protected domestic market and involves more the \$300 million in long-term investments to create an industry whose long-term break-even point (**before interest and taxes**) will be between \$205/t and \$225/t (i.e., from 37% to 50% **above** the world market price).⁹⁶ Before coming to a definite conclusion, however, one would need to investigate whether:

- big differences exist between the social and private costs of production, a possibility not examined by LMC's strategic analysis for Mozambique (LMC 2006a and b);
- large-scale local production of ethanol would be internationally efficient and competitive, an option that LMC only considered for molasses⁹⁷ because producing and exporting sugar was deemed far more profitable than using sugarcane to make and export ethanol, an assumption that may no longer be valid given the recent surge in energy prices (LMC 2006a:37-38);
- Brazil will continue to be the main marginal supplier of sugar on the world market thus depressing world prices (as assumed by LMC) or, instead, divert considerable quantities to make ethanol, especially considering the strong rise in energy prices, the surging international demand for ethanol, and the Brazil's wildly popular, recent introduction of “flex-fuel” cars that use gasoline, ethanol or any mix thereof (Orellana 2006:232);⁹⁸ and

automatically open the procedure to decide whether measures such as suspension or temporary withdrawal of trade concessions, surveillance or other safeguard measures need to be applied” (Council of the European Union 2006:5).

⁹⁶ LMC (2006a) projects that, to be competitive, the world price of sugar f.o.b. Mozambique will be \$150/t (LMC 2006b:48).

⁹⁷ If Mozambique mandated a 10% ethanol mix for gasoline, that would only suffice to absorb half the future production of molasses in Xinavane and Maragra sugar factories in the south (LMC 2006a: A64).

⁹⁸ “Today, less than three years after the technology was introduced, more than 70% of the automobiles sold in Brazil, expected to reach 1.1 million this year, have flex-fuel engines, which have entered the market generally without price increases” (Rohter 2006). Even before the recent leap in energy prices, Koizumi (2003:6) predicted that, “as a result of a high domestic ethanol price, Brazilian sugar production is predicted to shift from sugar to ethanol production. In 2006, the domestic anhydrous ethanol price is predicted to be much higher than the crystal

- the ethanol and co-generation projects could earn Emission Reduction Credits under the Clean Development Mechanism.⁹⁹ If earned, such credits would weaken the report's justification for calling for protection and tax concessions for the proposed ethanol project.

Table 12. *Percentage of farm gate prices attributable to border protection and direct subsidies by country and group, 1986–2002, evaluated at world prices*

Country or group	Market price support (border protection)			Direct subsidies			Total support to producers		
	1986	1995	2000	1986	1995	2000	1986	1995	2000
	–88	–97	–02	–88	–97	–02	–88	–97	–02
OECD	48.2	28.2	28.1	4.3	13.3	16.7	62.5	41.5	44.9
European Union	65.3	28.3	30.3	10.5	20.4	23.1	75.8	48.8	53.4
United States	16.0	7.5	9.3	18.3	7.4	16.9	34.3	14.9	26.2
Japan	145.4	131.7	131.5	16.8	13.0	14.4	162.1	144.7	146.0
Eastern European countries ^a	45.2	8.7	14.1	18.3	4.8	8.0	63.6	13.5	22.1
Australia and New Zealand	4.2	2.8	0.3	6.4	3.9	3.2	10.6	6.8	3.6
Canada	53.1	42.6	10.9	11.1	12.8	12.1	64.2	55.4	23
Other developing OECD ^b countries	31.4	38.1	44.2	6.4	8.0	8.4	37.8	46.1	52.6

Source: Aksoy (2005:53) based on OECD. PSE Database.

^a Czech Republic, Hungary, Poland, and the Slovak Republic.

^b Republic of Korea, Mexico, and Turkey.

sugar price. ... Brazil's sugar production is predicted to decrease by 0.3% to 2.5% during this period, [and] exports ... by 0.7% to 2.9%. ... On account of this country's diminishing sugar production, world sugar production is predicted to decrease by 0 to 0.2%, ... and world sugar export[s] ... by 0 to 0.3%. As a result, ... the world raw sugar price is predicted to increase by 0.34% to 2.23%."

Though others predict that Brazil will continue to increase its sugar exports (Koo and Taylor 2005:9), now, with oil prices above \$70/barrel, a much larger switch from sugar to ethanol can be expected since, whenever "oil prices rise above \$50/barrel, ethanol starts to compete with oil" (Orellana 2006:232). Thus, the link between the prices for oil, ethanol, and sugar is clear. Indeed, "in 2005, the futures market for sugar rose by 62% on the back of rising international demand for ethanol" (Orellana 2006:232). Not surprisingly, Brazil is currently negotiating to supply 3% (1.8 billion litres of ethanol) to Japan in phased increments and Paes de Carvalho, director, Brazilian association of biotech companies, affirms that "Petrobras anticipates exports of 8 billion litres in 2010, by which [time] ... total production will have reached 26 billion litres" (Orellana 2006:232).

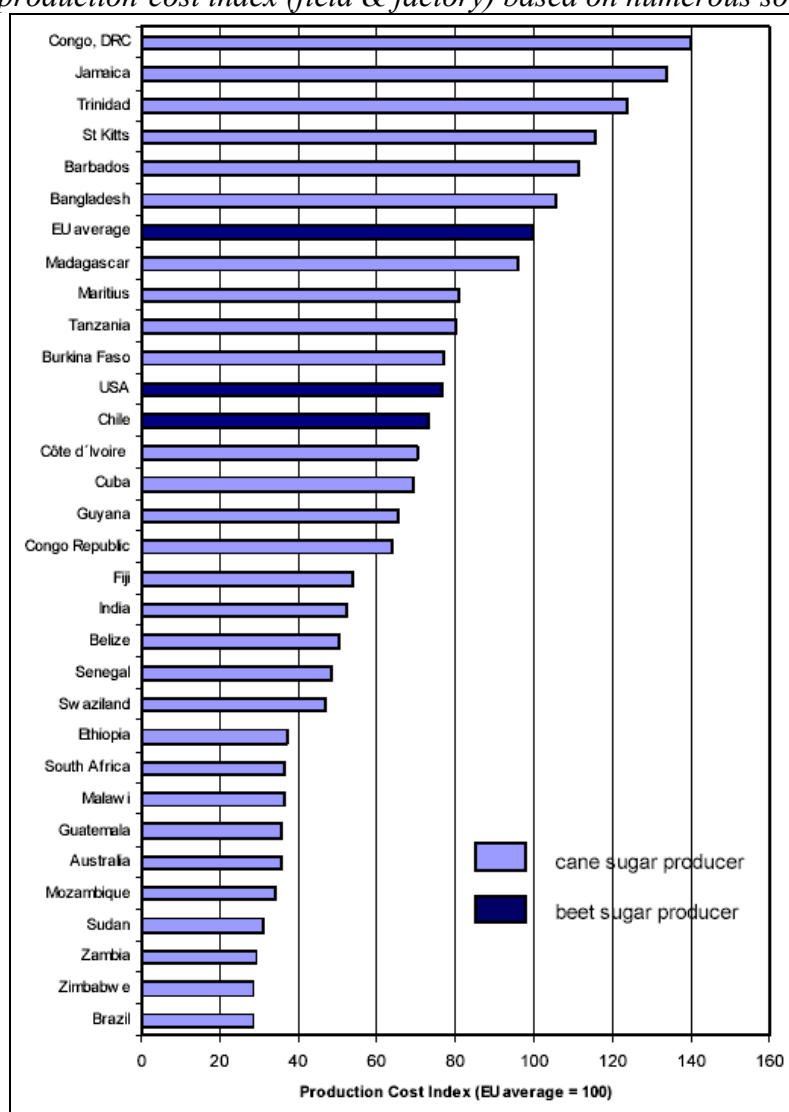
⁹⁹ Since LMC assumed—erroneously—that Mozambique had not yet ratified the Kyoto Protocol, the report's authors decided to exclude from their financial projections any possible Clean Development Mechanism credits for reducing gasoline and diesel consumption due to the ethanol project (LMC 2006a:A73, A112, A114). In fact, Mozambique acceded to the Kyoto Protocol on 18/01/05 and it came into force on 18/04/05 (UNFCCC 2006:4). In April 2006, Mozambique formally established its National Authority under the protocol thus clearing the way for the approval of CDM projects.

Table 13. *F.o.b. production costs, 2012/13 (\$/t for bulk raw sugar)*

	Field costs	Factory costs	Transport & other costs from factory to port	Total f.o.b. costs
Australia	146	61	8	215
Brazil (Centre/South)	79	36	26	140
Malawi	135	54	64	252
South Africa	160	54	41	255
Thailand	158	62	14	234
Zambia	140	62	180	382
Mozambique (2001/4 average)	177	114	35	326
Mozambique (2012/3 after expansion & modernization)	157	56	35	248

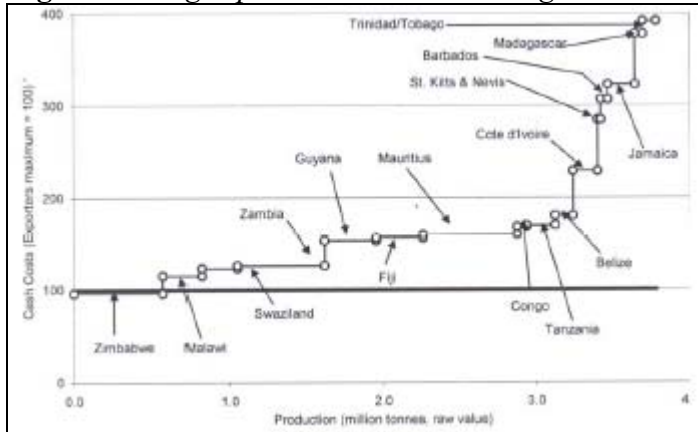
Source: LMC (2006a:36)

Figure 11. *Ranking of countries according to their sugar-production-cost index (field & factory) based on numerous sources*



Source: Huan-Niemi and Kerkelä (2005:11)

Figure 12. *Sugar production costs, average 2000-03*



Source: LMC/OPM (2004)

Note: Production costs (on an f.o.b. basis) relative to those associated with the leading sugar exporting countries (=100).

Cotton is also contentious. Large subsidies underpin US cotton exports. “The US produces about 20% of the world’s cotton, and exports about one third of the world’s trade” (Sandrey 2004:43). The subsidies paid directly to US farmers guarantee their profitability while supporting US cotton exports, exports that depress prices and saturate markets, thus denying a livelihood to millions of smallholders in developing countries (Sandrey 2004:43). “For 2001–02, direct government assistance to US cotton producers reached \$3.9 billion; China’s support totalled \$1.2 billion; and the European Union’s was almost \$1 billion. Producers in Brazil, Egypt, Mexico, and Turkey received a combined total of \$150 million in support. India also supported its cotton sector in 2001–02 with an estimated \$0.5 billion” (Baffes 2004:264).

The removal of US trade barriers and subsidies on cotton would dramatically shift the direction of export flows and increase world prices with strong benefits for Africa. Using the FAFPRI multi-market, world agricultural model, Fabiosa (2003:871) estimates that, with the removal of US trade barriers and subsidies,

world cotton prices increase about 15% above baseline levels.¹⁰⁰ As the US loan program, Step 2 Payments, and export subsidies are removed, US cotton production, consumption, and net export[s] decline by 11%, 2%, and 13%, respectively. EU cotton production falls by about 79.0%, and ... net import[s] [of cotton] increase by 143.1%. As world cotton prices rise, Africa, a large cotton-exporting region, increases its cotton exports by 12.3% above baseline.

Thus, Africa would export more, at a higher price and significantly higher net income, with reductions in poverty especially as farmers move from subsistence to market agriculture! And Mozambique? Its fate would depend on improving its abysmally low yields and the quality of its cotton.

Similar impediments hamper developing countries’ agricultural exports to the EU, US, and elsewhere. The literature is too vast to review here. Clearly, however, Mozambique has been correct in joining other less developed countries to create leverage and negotiate for liberal access to northern markets.

¹⁰⁰ Similarly, Sumner (*circa* 2003:1) found that, “during the period of marketing years 1999-2002”, had the six major “domestic and export subsidies for US upland cotton been removed, US exports would have declined on average by 41.2%, and the world (A-Index) price of upland cotton would have increased by 12.6%”.

Sanitary and Phytosanitary Measures and Technical Barriers to Trade

While—as agreed under WTO—countries certainly have a right to use sanitary and phytosanitary (SPS) measures¹⁰¹ and technical barriers to trade (TBTs)¹⁰² to guarantee the quality of imports, they should be based on reasonable, not excessive, standards supported by scientific research findings and their application should not be arbitrary or capricious, discriminate unjustifiably “between countries where the same conditions prevail”, or serve as a “disguised restriction on international trade”.

Abuses aside, worldwide—especially in the EU, US, and other developed countries—the regulations and technical standards governing imports are growing stricter about production cleanliness, chemical residuals, labeling, and packaging for agricultural products, especially food, impose costs and require capacities often beyond the abilities of small producers and governments in developing countries. De facto, this can prohibit whole classes of producers from exporting at least until sufficient training has occurred, procedures put into place, and infrastructure and institutions built to ensure reliably compliance with the standards. A good example comes from a study of

the impact of uniform aflatoxin standards proposed by the European Commission on imports of cereals, dried fruits, and nuts from Africa. ... The difference between the proposed EU standard and the CODEX standard was estimated to amount to a 64% (\$670 million) reduction in African exports of the goods in question to Europe, as contrasted with an estimated health benefit of the standard of 1.4 annual deaths per billion persons (Ferrantino 2006:33 based on Otsuki, Wilson and Sewadeh 2000).

As Mozambique moves into or targets export markets for raw or processed agricultural products, TBTs, and SPS measures will become increasingly important (Table 14 and Table 15). But the National Institute for Normalization and Quality (INNOQ) was only created in 1993, and.

currently Mozambique has only the rudiments of a system of standardization, quality assurance, accreditation, and metrology. Activities in standardization and quality assurance are not enough to meet domestic requirements and those arising from the importation of goods. There is at present no subsystem of certification. Most sectors have no standardized procedures, and there is no system of consultancy for industrial firms on issues relating to standardization and quality assurance. Factories in Mozambique use different systems of standardization at the same time (da Silva and Carrilho 2003:120).

For some exporters, the problems are already being felt in Mozambique, partly due the inadequacy of the system of standardization, quality assurance, accreditation, and metrology and partly because of the inadequacy of internal process and quality controls. For example:

¹⁰¹ According to Annex A of the *Agreement on the Application of Sanitary and Phytosanitary Measures*, these “protect human, animal or plant life or health” from (a) “pests, diseases, disease-carrying organisms or disease-causing organisms”; (b) “risks arising from additives, contaminants, toxins or disease-causing organisms in foods, beverages or feedstuffs”; and (c) “risks arising from diseases carried by animals, plants or products thereof, or from the entry, establishment or spread of pests”; or (d) “other damage within the territory of the Member from the entry, establishment or spread of pests”. Sanitary and phytosanitary measures are expressly outside the scope of the Agreement on Technical Barriers to Trade.

¹⁰² According to Annex 1 of the *Agreement on Technical Barriers to Trade*, a technical regulation is a “document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method.” This also covers conformity assessment procedures, i.e., “any procedure used, directly or indirectly, to determine that relevant requirements in technical regulations or standards are fulfilled”.

- due to the lack of “harmonization of standards and regulations within the SADC region, ... re-testing and re-certifying of products is common within the region. This results in large financial and economic losses to traders and national economies, including Mozambique” (Mussa, Vossenaar, and Waniala 2000:41).
- The EU regulations on aflatoxins have thwarted the exportation of Mozambican peanuts since, with its present techniques, Mozambique has one of the world’s highest rates of aflatoxin and other mycotoxin contamination (da Silva and Carrilho 2003:104; Castel-Branco et al. 2003:93-94).
- Typically—according to the director of INNOC—throughout the fruit and vegetable chains, “there is no awareness about the need to apply good hygienic practices ... and the Hazard Analysis and Critical Control Point system is not known, with the result that the basic principles of quality are not applied” (da Silva and Carrilho 2003:94). Thus, “SPS requirements have limited [the] access ... [of] several fruit and vegetable products. The requirement that Mozambique have an up-to-date pest study, which it does not meet, has also discouraged exports” (Nathan Associates 2004:5-9). Despite these observations Citrum, a new company, seems to have eliminated the huge (30% to 40%) rejections experienced on export shipments by predecessors in the Mozambican citrus industry.
- In a recent study analyzing the impact if Mozambique signs an Economic Partnership Agreement with the EU, “over 50% of respondents said that the main problem for exports were sanitary and phytosanitary measures. This shows two things, (a) how important [these are] as a trade barrier and the need to tackle ... [the problem] and (b) that current efforts are obviously failing if over 50% still think of SPS as the main problem” (Castel-Branco et al. 2003:93n).

To a large extent, however, the technical, infrastructural and human-resource weaknesses plus the need for regional and international harmonization and simplification of requirements have been well identified. Recognizing these and other weaknesses, Mozambique’s Action Plan for development of the national standards and regulatory system prioritizes (but with insufficient resources):

- developing “an appropriate regulatory system, including food safety issues and effective control mechanisms for import and export goods”;
- developing “an appropriate standards setting system, including facilities for training, metrology, accreditation, testing and certification”;
- strengthening “the country’s participation in regional and international standards setting bodies”;
- improving “the response of the country on issues related to WTO, mainly [the] SPS and TBT Agreement[s]”; and
- supporting “the development of selected sectors to improve exports” (da Silva and Carrilho 2003:138).

Table 14. *Environmental measures with potential trade effects on countries in eastern and southern Africa*

Pesticide residues	Standards for maximum residue levels for pesticide may have both consumer health and environmental impacts.
Packaging	African exporters have been concerned about the effects of packaging requirements on their exports.
Eco-labelling	Eco-labelling may have effects on exports of some product categories. For example, eco-labelling may become more important in the cut flowers and fisheries sectors.
Timber	Timber exports may be affected by consumer boycotts and/or timber certification. On the other hand, several African countries (e.g., Mozambique) see timber certification as a means to promote exports as well as the sustainable use of forests.
Montreal Protocol	Freeze in consumption and phase out of methyl bromide,* used in agriculture and crops, such as cut flowers

Source: Mussa, Vossenaar, and Waniala (2000:7)

* a highly toxic fumigant used, for example, on tomatoes, strawberries and flowers

Table 15. *Factors adversely affecting Mozambique's ability to comply with SPS measures and environmental requirements in external markets*

Ranking	Factor	Importance now	Importance in future
1	Insufficient access to technology	✓	✓
2	High cost of imported imports	✓	✓
3	Lack of awareness or access to information on the part of the exporter	✓	✓
4	Insufficient domestic infrastructure (lack of testing facilities)	✓	✓
5	High compliance cost	✓	✓
6	Legal factor (lack of enforcement)	✓	✓
7	Stringency of the measure (which may be perceived as unreasonable)	n.a.	✓
8	Firm size	n.a.	✓
9	Insufficient supply of environment-friendly inputs, prescribed chemicals	n.a.	✓
10	Lack of transparency in the design and implementation of measure in the importing country	n.a.	✓

Source: Mussa, Vossenaar, and Waniala (2000:17)

Regional and International Trade Liberalization and Industrial and Agricultural Development Planning

Mozambique benefits from:

- unilateral concessions granting preferential and usually tariff-free access to the EU market under the Cotonou Partnership Agreement between the EU and the ACP countries;
- the EU's unilateral Everything-But-Arms Amendment, which (except for rice, sugar, arms and ammunition) grants least developed countries tariff- and quota-free access to the EU market subject to certain rules of origin that are sometimes prohibitive for manufacturing but virtually always satisfied for agricultural products grown in the exporting country; and

- the Africa Growth and Opportunity Act of 2001, granting African countries tariff- and quota-free access to the US market to 6,500 goods if, according to the rules of origin, they are deemed to have been produced within that country.

Mozambique is also committed to the progressive regional trade integration within the Southern Africa Development Community (SADC) that will lead to a sub-Saharan free trade zone in 2012 or, perhaps, a customs union. The government is also engaged in negotiations about: (i) trade liberalization worldwide within the GATT/WTO framework; (ii) an Economic Partnership Agreement that Mozambique, together with six other SADC countries is negotiating with the EU,¹⁰³ and (iii) a free trade agreement with the US.

In the later two negotiations, Mozambique's major objectives are (i) to turn the unilateral and, hence, revocable concessions by the EU (under the Cotonou Partnership Agreement and Everything-But-Arms Amendment) and the US (under AGOA) into permanent treaty obligations and (ii) to obtain development assistance to help to create the infrastructural and institutional capabilities required by large international investors.¹⁰⁴ Given that, as a LDC, Mozambique already has tariff- and quota-free access to the US and EU markets, an EPA, by itself, would **not stimulate exports** to the EU but would increase imports from the EU by, on average, 5.8%, of which 4.4% would be due to trade creation and 1.4%, due to trade diversion mostly to the disadvantage of South Africa (Castel-Branco et al. 2004: viii). Thus, the impact would be small but not insignificant. Indeed, Castel-Branco et al. (2004:72) found that:

in the vast majority of the interviews with private companies and social organizations, it was emphasized by them that the expected short run impact of an EPA on the Mozambican productive sector is expected to be minimal, in the sense that there are not many activities remaining to be displaced, or that are not going to be displaced by other trade protocols, such as the SADC Trade Protocol. The main exception was found in the wheat-based cereal milling and bakery industry, which could be displaced by cheaper imports of low quality flours and biscuits from Holland, Belgium, Greece and Turkey. It is possible to get flour from Holland and Belgium at a c.i.f. price cheaper than the c.i.f. price of imported, high-quality hard wheat from the USA that is utilized in the largest cereal milling plants in Mozambique.

Even under the Doha scenario for global trade liberalization whereby, "as a LDC, Mozambique does not have to reduce its tariffs", Mozambican exports would only increase by 0.2%, according to Arndt (2005:18 and 32).¹⁰⁵ The big, substantial obstacles arise from **subsidies, not tariffs**, as illustrated in the prior discussion of sugar and cotton (see pp. 44 to 51). For most developing countries, the elimination of agricultural subsidies is the big prize to shoot for in the Doha Round's agricultural negotiations.

Rather than being a direct stimulus to increased trade, such agreements would *hopefully* facilitate investment. However, *no study* exists to identify why, after surveying the country's

¹⁰³ Till recently South Africa was merely an observer in the negotiations between the EU and six members of SADC (i.e., Angola, Botswana, Swaziland, Lesotho, Mozambique and Tanzania), but, in April 2006, it joined the six as a full negotiating partner.

¹⁰⁴ interview with Luís Siteo, National Director for International Commerce, Ministry of Industry and Commerce, 2/5/06.

¹⁰⁵ Arndt (2005:32) predicts that, if Mozambique also fully liberalized, it would increase its exports by 4.4%. Though he claimed that his model eliminated agricultural subsidies under his Doha scenario, the impact for sugar, cotton, and fruits may well be far larger than his model predicts because he uses downward sloping demand curves even though Mozambique is a tiny producer in world markets. In fact, Arndt, himself, argues against this assumption: "While [this is] perhaps a reasonable specification for some sectors, exports from many sectors are likely constrained by *supply factors*. In this view, more could be exported at a *constant price* if more could be produced. In fact, for many sectors, low export volumes are often pointed to as a cause of low prices, particularly at the farm or factory gate. Low volumes are viewed as a cause of high marketing costs and diminished confidence of potential importers in the quality and reliability of supply of Mozambican products" (Arndt 2005: 22, italics added).

infrastructural, institutional and policy environment, some investors went to other sites. Were their motives related, in any way, to problems that would be alleviated by free-trade agreements? All we know is that 76% of those who did invest in Mozambique claim that the government's investment tax incentives were not critical to their decision to come here¹⁰⁶—an affirmation that *tells us nothing* about why other fish sniffed and turned away! Were their reasons for avoiding Mozambique related to problems that, in the short or medium term, the country could overcome or ameliorate? Would such changes have been sufficient to induce the investments? And, finally, can free-trade agreements reduce such problems and bring more investment?

Scientifically, *we do not know!* The elusive nibblers have never been studied.¹⁰⁷ And, the internal and external economic conditions are changing and so is the relative attractiveness of Mozambique for investors. Will new fish bite? Without detailed studies, integrated planning, and an analysis that shows an enticing bait—good profits—it is hard to predict whether investors will come spontaneously. In a free enterprise economy, planning that is not sufficiently detailed, has scant resources to execute critical elements, and does not offer the clear, strong allure of profit is based on hope or dogma, not science.

The evidence seems sufficient, however, to conclude that, given the scant development of Mozambique's industrial sector, free-trade agreements are likely to have, on net, a marginally positive effect on the economy while bringing additional capacity-building and development funds and *perhaps* stimulating investment. That seems to be a risk worth taking *if* industries or services that can *realistically* become competitive within five or ten years were nurtured and protected.

Knowing which industries and value chains to protect and nurture requires, however, a detailed analysis of (i) the prospective improvements in their efficiency all along the chain—growers, merchants, transporters, processors—and (ii) the forecasted changes in international demand and prices, especially in view of the progressive elimination of agricultural subsidies and other barriers under the WTO, e.g., for sugar, cotton, wheat. It also requires an integrated, well-articulated strategy to develop agriculture, agro-processors, and auxiliary industries into efficient and complementary value chains benefiting from adequate infrastructural support. Investment and the expansion and development of competitive export industries is key. Without that, the gains from an EPA or a US-Mozambique free-trade agreement would be minimal. For that, the strategy must be soundly based, well designed, and properly articulated.

With, however, roughly 30 sectoral strategies and no overarching strategy or adequate mechanism to prioritize, link, and coordinate activities, the government's approach has been fragmented and based on poorly integrated analyses, with results far from optimal, especially for agriculture and agro-processing. In evaluating why the country's 1997 industrialization strategy failed, the recently proposed *Reformulation of Industrial Policy and Strategy in Mozambique* (including agro-industries) concluded:

each ministry had its portion of manufacturing industries and its own independent strategy (in some ministries the national directorates each had their own strategy). Each subordinate institution had its objectives, interests, and priorities. There was no mechanism to articulate a unified industrialization strategy. ... Fiscal, monetary, customs, and labour policies and those for investment incentives were not coordinated among themselves nor with the priorities for

¹⁰⁶ According to Macamo (2000:24–26), 76% of his 31 respondents affirmed that they would still invest in Mozambique even after knowing what they have learned about the country's problems and that they would do so even without the fiscal incentives given by the government through the Investment Promotion Centre. Accordingly, he argued that the various tax exemptions, derogations, and reductions may be a waste of public funds.

¹⁰⁷ Though Nathan Associates (2004b: 3-17 to 3-21) present a very useful comparison of regional tax rates before and after incentives, this does not directly answer the question: why have many investors scouted but declined to come to Mozambique? What were the primary motives for those decisions? We can guess, but in the absence of research, we do not *know* why.

investment and development. The same happened with infrastructure. Indeed, the articulation *between* the strategies for telecommunications, energy, water, road and rail transport, and ports development *and* the potentials for industrial development is still weak (Ernst & Young and EconPolicy Research Group 2005:18 and 23).

Similarly, an earlier study found that “the different capacities of the state and productive sector have no way of being coordinated around nuclear and common objectives, and policies and strategies of the different ministries and departments tend to be either irrelevant or in conflict to each other and tend to reinforce fragmentation in policy making and implementation” (Castel-Branco 2004:77). For example, despite the Niassa’s potential, disarticulation led to the collapse of the Mozagruiis program because, although farmers got land, they got very little financial or infrastructural support and virtually no social services (Alberts 2001:18).

The problem—fragmented, disarticulated planning—is well identified and urgently needs a solution to improve the coherence, synchronisation, and efficacy of planning and investment.

Conclusions

In low income countries, development is often uneven, inefficient, badly coordinated, and stymied by numerous and diverse obstacles, both internal and external. With growth, the progressive appearance and disappearance of ill disciplined, price-gouging monopolies—national and local—impede profitable downstream investments and manoeuvre to delay competition and the demise of their privileges. Corruption too favours mediocre, inefficient and immoral operators abetted by complex bureaucracies with numerous points for illicit entrée.

Whether this, a dirty historical process, leads to growth, stagnation, or decline depends largely on whether the dominant political forces and the economic interests they represent have an avid interest in national growth and technological advance. If growth is fast, the nation at large benefits *despite disparities*. If slow or stagnating, poverty deepens and the disparities become a flagrant enticement to criminals and, sometimes, rebellion, peaceful or violent.

Mozambique too is engaged in this process, growing less than perfectly, *but growing—and quickly!* It is investing in people, creating or reforming institutions, adapting technology, and building infrastructure. For many, the results are palpable: less poverty, more schools, a rising real minimum wage, and a burgeoning elite. For others, it is urban unemployment and yet isolated, nearly autarkic communities or villages that market little and never see an extension worker. Still, the network of infrastructural investments—e.g., roads, electricity, communication, and schools—is thickening and advancing into ever more remote rural areas while, quick behind, come merchants offering to buy crops or sell goods albeit at terrible prices till competitors arrive and farmers learn, often through their associations, to bargain better and be informed about prices publicized by the Information System for Agricultural Markets or others. And, with the spread of extension services, ONGs, merchants, and concessionaires, technology is coming to the peasant. Some that she *cannot* use; some that she *should not* use; and some that she *readily accepts* as beneficial, secure, cheap, and profitable.

And therein, the lesson, a long-known lesson: peasants accept new technology if it is cheap and profitable and the risks are low. The organizational recognition and acceptance of this adage, though belated, was achieved with the creation of the Agrarian Research Institute of Mozambique (IIAM) including an economic research unit. The unit’s function is to ensure that the institute spends its resources on crops that will **have markets** and on techniques that are not **overly risky** for impoverished farmers, especially if they fit well into their traditional strategy of minimizing risks by diversifying their crops and activities. The institute’s new focus and capacities augur much better linkages between research, extension work, and markets. Moreover,

the extension service is discovering that creating and working through farmers' associations is, by far, more efficacious and efficient than the traditional train-and-visit model.

Meanwhile, the geo-political and economic environment is changing. Through unilateral concessions, regional trade agreements, and a progressive series of agreements under the WTO, tariffs and tariff quotas are fast disappearing, leaving subsidies, other non-tariff barriers, and sanitary and phytosanitary regulations as the last guardians at the gates to markets in the US, EU, Japan, and other developed countries. And even these impediments are being nixed or rationalized, *though slowly*. Moreover, the soaring international prices of petroleum and, consequently, agrochemicals may revive interest in biofuels, alternative labour-intensive technologies, and, for some agricultural activities, animal-drawn transportation to cut costs and foreign-exchange dependence and create jobs.

Still, for agricultural growth and intensification, obstacles abound. Inputs are too costly; the technologies developed or promoted are not always appropriate for small farmers; merchants and concessionaires may underpay or overcharge; land and agricultural credit are hard to get; corruption abounds; and planning with more than 30 strategies is manifestly disarticulated. Of these problems, some are being tackled and others, totally ignored.

Behind the obstacles, however, opportunities peek! Not always, but often. Sometimes, by thinking flexibly, thinking out of the box, solutions can be had—often surprisingly cheap solutions—that, if implemented, would cut costs, reduce foreign-exchange dependence, raise incomes, and stimulate investment, production, and sales. Examining and implementing those options, however, requires us to confront bureaucratic inertia and sometimes clash with the special or corrupt interests that benefit from the *status quo*.

Will Mozambique seize the opportunities? A decade from now, what will we say? Did *initiative* conquer *deixa andar*?¹⁰⁸

Recommendations

Instead of a litany of often repeated proposals, below is a shortlist of novel or strategically important recommendations that promise significant gains if investigated or applied.

Inputs

- Of small farmers, 82% complain that the poor or costly supply of seeds is their **main agricultural problem**. Moreover, though various seeds for grain and legumes exist that are highly productive, viable and appropriate for Mozambique, many are not disseminated or are used by but a fraction of all farmers. The cost of this failure is immense (i.e., estimated, in 2001, at \$97 per annum per farm household or \$260 million per annum nationwide) and its causes and possible solutions need a systematic analysis—crop by crop, region by region—to motivate reform or the reallocation of resources to overcome obstacles. (See pp. 10 and 11.)
- Due to low usage and disperse purchasing, Mozambique's c.i.f. prices of agrochemicals (e.g., fertilizers and pesticides) are much higher than that attainable through bulk purchases from the Middle East. To identify significant possibilities for national or regional bulk purchases, government should commission a study of the volumes used and prices paid within the region for popular agrochemicals. If significant opportunities exist to cut costs through bulk purchasing, the researchers should recommend the structures needed to realize these gains and, when appropriate, the government should initiate regional contacts to achieve the required volumes. (See pp. 20 and 20.)

¹⁰⁸ *undisturbed continuance* or, literally, *let it keep walking*

- Though often a problem in other African countries, no published assessments exist about the quality of agrochemicals in Mozambique. An evaluation is required to know (i) if their monitoring and quality is adequate and, if not, under what circumstances, and (ii) how to ensure better that farmers get well formulated agrochemicals. (See p. 23.)
- Since dangerous mishandling of agrochemicals is so common, it is urgent to learn why and what can be done to protect farmers and their families. What have been the consequences for farmers' health? Do the concessionaires consistently supply farmers with adequate protective gear? Do the farmers resist using that gear? Why? Do extension workers adequately educate them about the dangers and about how to use the equipment properly? What can be done to improve compliance by both companies and farmers? (See p. 23.)
- Given that cash-crop farmers buy nearly all their agrochemicals from the concessionaires and preliminary evidence suggests that, sometimes, their prices and implicit interest rates may be exorbitant, a quick study should be commissioned to ascertain whether, in fact, the prices and interest rates are justifiable or excessive. It should also study whether loyal farmers with good repayment histories are forced to subsidize credit for farmers with bad credit records and new entrants with unknown talents and dependability. If cross-subsidization occurs, alternative systems should be devised to reward, instead of penalizing, reliable farmers. (See pp. 21 and 22.)
- So long as the government relies on concessionaires to grow cash crops in certain regions, it should insist that they use their infrastructure to promote **all farmers** in their areas, be they cash-croppers or not. Hence, as part of their mandate, concessionaires should sell—for cash (hence, profitably and at no risk)—agrochemicals, including fertilizers, in large and small packets to **non-cash-crop farmers** at the same price offered to their cash-crop farmers. (See p. 23.)

Research and Extension Services

- Investment—national or regional—to develop and disseminate disease resistant improved varieties appropriate for low-input agriculture augurs big returns and eager, widespread acceptance by small farmers. Moreover, the biggest successes have been with open-pollinating or self-propagating varieties. Accordingly, the allocation of resources for such research and consequent dissemination efforts merits considerable priority. (See p. 11.)
- The Ministry of Agriculture should commission an *independent* evaluation of the costs, benefits, and potential modalities of periodically rotating at least some extension workers to assist previously uncovered villages. (See pp. 32 and 33.)
- To take full advantage of the recent inclusion of agriculture and animal husbandry into the curriculum of rural primary and secondary schools, the Ministries of Agriculture and Education should urgently evaluate how the agricultural extension workers might help the teachers conducting these courses to improve their content while also considering local specificities. The ministries should also evaluate whether highly skilled extension workers might help the teacher training institutes to enhance the relevance and efficacy of their training. (See p. 28.)

Credit

- To support the extension of commercial banking services for farmers, encourage competition in the rural credit market, reduce interest rates, and increase local income, expenditures, investment and job creation, the concessionaires should be encouraged to offer to cooperate with local banks by deducting and automatically remitting loan

repayments from the proceeds of farmers who, when contracting the loan, agree formally to permit such deductions. The government should also encourage the concessionaires to promote credit unions, initially for their employees and later for cash-crop farmers, and agree to deduct the loan repayments from their salaries or harvest payments and thus reduce default rates to acceptable and sustainable levels. Building such institutions to become large, stable organisations is, however, a long process, and the concessionaires will need to continue to cede massive credits to their contracted farmers even after banks and credit unions begin to offer farmers alternative credit sources. (See pp. 21 and 22 including note 51.)

- The government should seriously evaluate the creation of a national depositors' insurance fund for banks and credit unions to bolster depositors' confidence and savings. Insurance would reduce depositors' risks and, hence, encourage them to support and accelerate the formation and growth of banks and, importantly, small financial institutions serving farmers and small entrepreneurs. Though the task is complex, involving issues of risk, eligibility criteria, and the level of insurance fees to ensure the fund's financial stability, the scheme—if created—would remove a significant obstacle to the creation of low-cost financial mediation services targeting small entrepreneurs and farmers in both rural and urban areas. (See p. 40.)

Production

- The assumptions about international sugar demand, supply, and prices so critical for the analysis supporting the recent proposal to expand the Mozambican sugar industry by more than \$300 million need review. This is especially so because the international literature on the topic points to (i) likely shifts in sugar market as a result of the recent huge surge in international petroleum prices, (ii) probable reactions by EU sugar producers and the ACP countries that are **not** covered by the All But Arms Amendment to the big increases in quota- and tariff-free sugar exports to the EU it allows **least** developed countries, including Mozambique, (iii) the sustainability of these privileges in view of the increasing numbers of Economic Partnership Agreements signed by various regional groupings with the EU, and (iv) the long-term (post 2012) viability of producing sugar at nearly \$248/t f.o.b. Mozambique whereas the long-term international price of sugar f.o.b. Mozambique is expected to be \$150/t. (See pp. 45, 50 to 51.)

Transportation

- Considering the recent big surge in petroleum prices, it is opportune to evaluate whether, for certain functions, animal-drawn transport is more economical than tractors, which depend on imported machines, energy, and spare parts. As an initial focus, government should commission a pilot study using oxcarts to transport nearby sugarcane to the mills and, further away, from fields to roads. If this proves to reduce costs and foreign-exchange usage per tonne transported, a major switch in technology could be encouraged, thereby promoting rural jobs and, via local demand multipliers, many self-employment activities. In time, the viability of animal-drawn transport could be evaluated for other crops, especially those whose harvests occur throughout many months in the year thus providing a steady demand for transportation services. (See p. 26.)

Physical and Institutional Infrastructure

- An analysis of the concessionaires' contributions to general development (e.g., inputs, roads, dams, schools, credit, and extension services) would be useful to compare their overall developmental impact, instead of merely focusing on direct income payments and job creation. Knowledge of the trade-offs and the impact of high-yielding social investments would help the government negotiate new or renewal contracts with concession companies. Due to the gap between private and social costs and benefits, alert, well informed negotiators may find many win-win opportunities whereby, at a small or negligible cost to the companies (or, perhaps, even a net benefit), large social benefits might be had, for example, from (i) the distribution of inputs to non-scheme farmers, (ii) stimulus to local credit unions, (iii) pro-active use of the companies' financial relationship with the schemes' smallholders in order to promote or stabilise local merchants by reducing their risks and, hence, costs, (iv) use of the companies' extension workers to advise local schools about how to improve their agricultural courses, and (v) improved cooperation between the companies and local authorities in the construction and maintenance of feeder roads and small dams. (See p. 23.)

Synchronization of Policies and Investment to Build Clusters and Value Chains

- Since non-existent or bad articulation severely hampers the coherence and effectiveness of sectoral strategies to build clusters and value chains including agriculture, transportation, processing and marketing, government should evaluate how to restructure or improve the present mechanisms for interministerial coordination. It should also explore how to empower the Ministry of Planning and Development to synchronize the timing and direction of the allocation of resources between interrelated sectoral strategies.

To be meaningful, however, authority requires control over resources. Hence, to enhance the coordination or consistency of sectoral strategies, government should evaluate whether to grant the ministry authority—within limits—to trim or augment the budgets of other economic ministries to ensure that specific sectoral activities occur as needed and in a timely fashion to complement activities elsewhere and improve overall coherence and efficacy. Under this scenario, the Ministry of Finance would retain *overall* budgetary control whereas the Ministry of Planning and Development would gain authority to prioritize and adjust, within the total ceiling, the allocations for *economic* ministries. This would allow strategy and policy—not merely budgetary considerations—to *lead* in allocating money to ensure coherent execution. (See pp. 56 and 58.)

- Since, albeit with problems and some financial collapses, the concession schemes are responsible for much of the recent growth in smallholders' production, incomes, and access to credit and modern technologies, the government should systematise its understanding of the factors contributing to their success or failure, including the mix and coordination of complementary private and state investments and other interventions required to guarantee success at stage of the value chain. That knowledge would enable it to design and promote such schemes more effectively for yet other food or energy crops, thus involving increasing numbers of smallholders and overcoming some of the problems associated with (i) their lack of capital and (ii) the need to maintain consistent quality standards in order to penetrate and *keep* foreign markets. (See pp. 22, 23 and 26.)

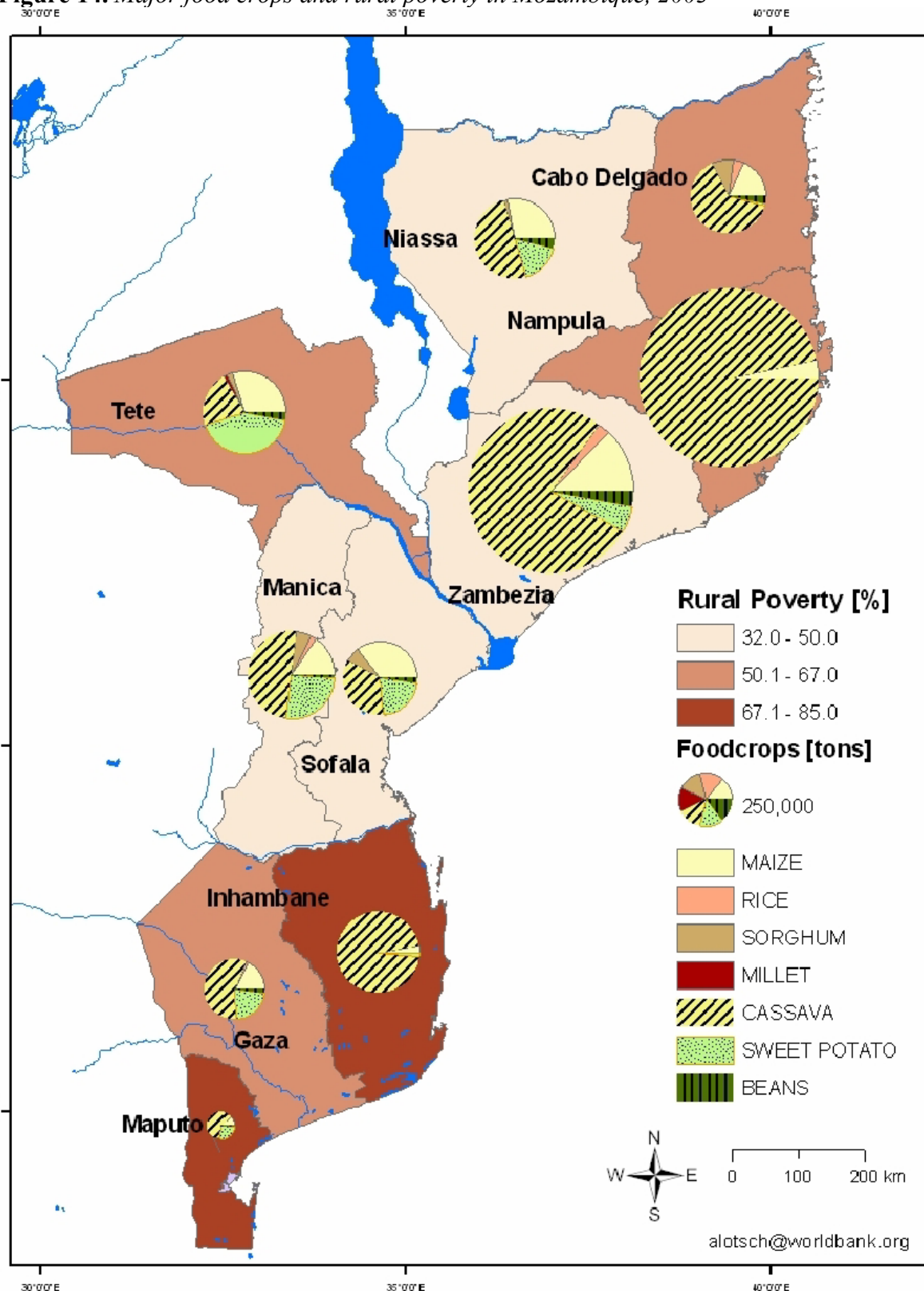
Annexes

Figure 13. Map of Mozambique



Source: http://www.lib.utexas.edu/maps/africa/mozambique_rel195.jpg

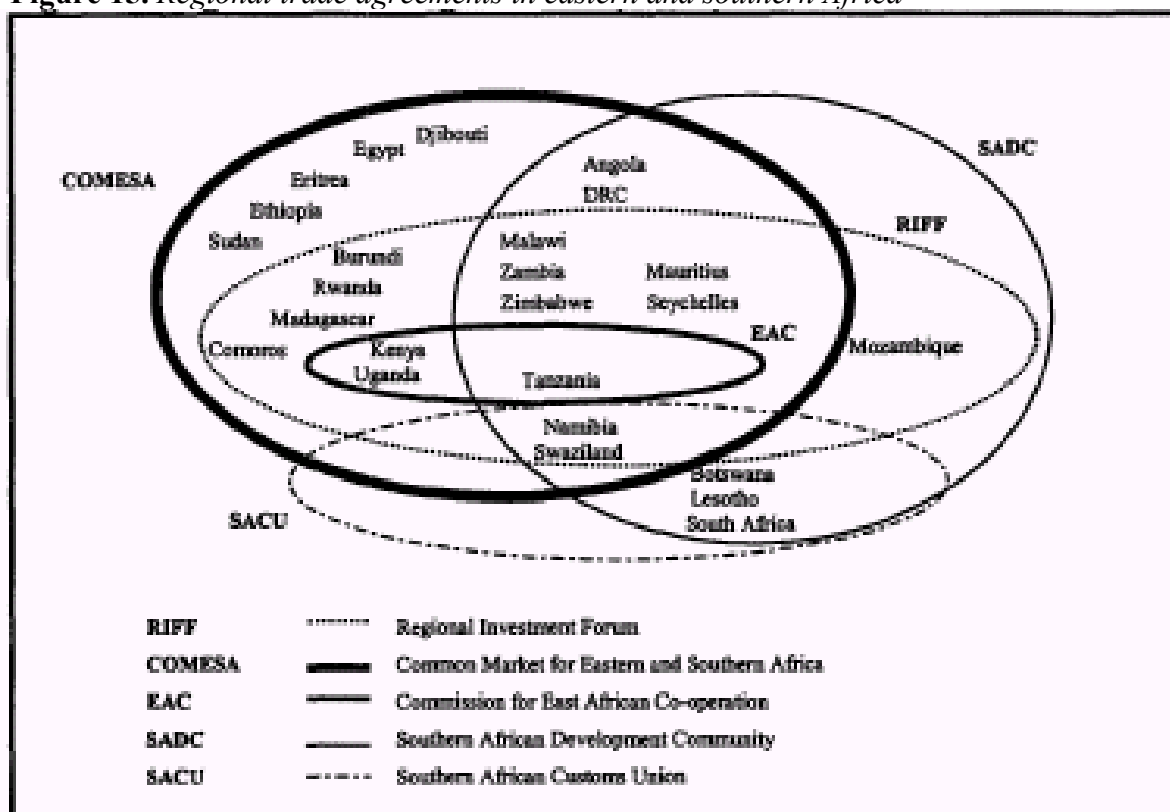
Figure 14. Major food crops and rural poverty in Mozambique, 2003



Source: World Bank (2005b:9). World Bank staff estimates. Mapping based on TIA¹⁰⁹ 2002/3 and unpublished information from Ministry of Agriculture. Rural poverty rates are from Fox et al. (2005) and are measured in per adult equivalent consumption.

¹⁰⁹ Trabalho de Inquérito Agrícola ao Sector Familiar, see MADER (2003b)

Figure 15. *Regional trade agreements in eastern and southern Africa*



Source: Rocha (2003:2)

Annex Table 1. *Production structure of the economy (%)*

	Value added	Exports	Imports	Exports/ Total output	Imports/ Total output	Domestic margin
Grain	5.7	0.2	4	0.8	42.4	27.4
Cassava	6.1	0	0	0	0	302.5
Raw cashew	0.7	0.2	0	5.7	0	44.2
Raw cotton	0.3	0	0	0	0	0
Other export crops	0.6	2.4	0.1	54.8	8.2	52.3
Basic food crops	6.8	0.3	1.6	0.9	10.9	111.2
Livestock	2.4	0.1	0.2	0.4	7.4	13.6
Forestry	3.3	1.7	0	9.3	0.2	14.9
Fishery	4.3	21.3	0	71.5	0	44.3
Food processing	2.8	8.6	18.8	13.7	26.9	58.7
All other sectors	67.0	65.2	75.3			
Total	100.0	100.0	100.0			
Average				12.5	26.9	11.9

Source: Arndt et al. (1999:7)

Annex Table 2. Basic characteristics of the agricultural sector, 2000-2003

Characteristics	Units	Year:	Size of farm enterprise			Total	
			2000 Small	2000 Medium	2000 Large	2000 All farms	2003 All farms
Number of farm households	1,000s		3,054.1	10.2	0.4	3,064.7	3,172.6
Agriculture as main activity	% of total pop.		...	...	...	65.5	...
Females: agriculture as main activity	% of females		...	...	...	74.6	...
Agriculture as secondary activity	% of total pop.		...	...	...	24.0	...
Females: agriculture as secondary activity	% of females		...	...	...	17.2	...
Female household head	% of total		...	...	...	23.1	25.7
Total cultivated land area	1,000 ha.		3,736.6	67.7	121.0	3,925.3	4,534.6
Average cultivated land area	ha/household		1.2	6.7	282.0	1.3	1.4
Area cultivated in food crops	%		84.4	74.2	7.6	84.7	...
Area cultivated in horticultural and other crops	%		4.8	8.3	1.2	5.2	...
Area cultivated in cash crops	%		4.7	5.1	30.2	5.6	...
Land title	% of households with at least one title		3.9	16.3	100.0	3.9	...
Assets							
Cashew trees	% of households		41.6	26.6	20.7	41.6	34.9
Mango trees	"		49.2	50.0	9.1	49.2	53.2
Papaya trees	"		36.3	36.6	3.7	36.2	37.2
Banana trees	"		30.2	33.4	13.5	30.2	...
Orange trees	"		19.7	14.6	12.8	19.6	17.7
Chickens	"		69.8	84.6	50.1	69.8	61.0
Goats	"		27.6	81.3	69.5	27.8	26.4
Pigs	"		19.6	31.8	26.1	19.7	14.0
Cattle or oxen	"		4.1	83.2	79.0	4.4	4.1
Technology							
Fertilizers	% of households		2.7	11.0	32.9	2.7	4.3
Pesticides	"		4.5	10.3	36.1	4.5	5.2
Animal traction	"		10.8	71.8	64.1	11.0	11.2
Irrigation	"		3.9	16.9	35.4	3.7	11.0
Extension services	"		...	...	...	...	13.3
Farmer's association	"		...	...	...	...	4.5
Access to credit	"		...	...	...	...	2.9
Basic agro-processing	"		...	...	...	...	46.4
Seed supply as main agricultural problem	"		...	...	...	...	82.0
Education							
Illiterate	% of household heads		...	...	...	43.9	42.6
3 years of primary schooling or more	"		...	...	...	38.2	38.9
Commercialization							
Maize	% of production sold		...	...	...	22.0	17.1
Rice	"		...	...	...	18.0	21.5
Sorghum	"		...	...	...	6.0	4.7
Millet	"		...	...	...	4.0	1.8
Groundnuts	"		...	...	...	30.0	26.4
Beans	"		...	...	...	28.5	25.3
Household with price information	% of households		...	...	...	...	47.2

Sources: Loening and Perumalpillai-Essex (2005) based on CAP 1999/2000, TIA 2002/3, IAF 2002/3, and Bias and Donovan (2003) as cited by World Bank (2005b:95).

^a As defined in the 1999/2000 agricultural census, small scale farms are those with less than 10 hectares of cultivated area, medium scale are those with 10 to 50 hectares, and large are those with over 50 hectares. However, in some cases, the census employs different criteria for farms having a significant amount of livestock or irrigated land.

^b The TIA 2002/3 includes small and medium farm enterprises only.

Annex Table 3. Summary of profitability analysis for major cash crops, 2004-2005

Models	Cashew	Rice				Cotton	Sugar		Potatoes		Paprika	Grapefruit	Bananas
	Improved planting and maintenance methods; local processing of nuts	Irrigated (Chokwe)		Rainfed (Zambézia)		CNA zone; small farmer	Average 4 operating companies		Current practices (Angonia)	Improved practices (seeds, fertilizer)	Contract farming Angonia	Large-scale orchard for export	
		Current situation	Improved	Current situation	Improved		Current situation	2012 forecast					
Production stage													
Unit	kg nut	kg paddy				kg seed cotton	tons raw sugar		kg potatoes		kg dried paprika	tons	tons
Unit cost (US\$) ^{a/}	0.07	0.1557	0.1008	0.1974	0.1259	0.1826	169.6	155.5	0.0718	0.0836	0.4885	45	50
Unit selling price by farmer (US\$)	0.4	0.1579	0.1579	0.1579	0.1579	0.1474			0.1053	0.1053	0.6300		
Profit per unit (US\$)	0.33	0.0022	0.0571	-0.0395	0.0320	-0.0352			0.0334	0.0216	0.1415		
Profit per ha (US\$)	393	5	343	-39	96	-18			267	541	102		
Farmer's remuneration per day of work (Mt) ^{b/}	339,500	26,073	147,792	15,455	31,605	15,360			65,375	81,143	25,529		
Processing/marketing stage													
Unit	kg nut equivalent	kg rice				kg lint cotton							
Cost/unit for the processor (US\$)	0.7931	0.4033	0.4033	0.3662	0.3662	0.88					1.02		
Price/unit (US\$)	0.956	0.4216	0.4216	0.4516	0.4516	1.15	312	343			1.2	507	350
Profit/unit for the processor (US\$)	0.1629	0.0182	0.0182	0.0854	0.0854	0.27					0.18		
Place of sale	FOB for kernels	retail Maputo		retail Quelimane		FOB	ex mill		local market		CIF	Delivered In Port	Delivered In Port
Global financial analysis (US\$)													
Total cost	0.4657	0.3998	0.3113	0.4298	0.3146	1.031	303	261.5	0.0718	0.0836	0.87	326	331
Net profit	0.4903	0.0217	0.1103	0.0217	0.1370	0.12	9.00	81.50	0.0334	0.0216	0.33	181	19
Part of profit retained by producer	67%	16%	83%	n. a.	38%	0%			100%	100%	43%		
Global economic analysis (US\$)													
Total economic cost per unit	0.51	0.551	0.356	0.415	0.292	0.985	280	242	0.070	0.082	0.85	301	305
Economic price per unit	0.96	0.370	0.370	0.394	0.394	1.15	209	243	0.105	0.105	1.20	507	350
Economic profit per unit	0.45	-0.181	0.015	-0.021	0.102	0.17	-72	1	0.035	0.023	0.35	206	45
DRC (at place of final sale)	0.10	-2.60	0.81	1.07	0.53	0.76	17.04	0.99	0.36	0.38	0.58	0.15	0.40

Source: Gergely (2005) cited by World Bank (2005b:119).

^a Based on a standard cost of Mt 20,000 per man-day, either hired or family labour.

^b Assuming all the labor is family labour (profit divided by number of man-days).

Annex Table 4. Mozambique price competitiveness

		Actual price at collection point in Moz. Metical	Maximum price in order to compete in South Africa (calculated back to collection point in Moz.) Metical	Price competitiveness	Maximum price at collection point if the price in South Africa fluctuates up or down by:			
					-20%	-10%	10%	20%
Bananas	Maputo	4,000	5,911	Marginal	4,729	5,320	6,502	7,093
	Manica	4,000	3,707	No	2,966	3,336	4,078	4,448
Dried beans	Cabo Delgado	7,500	17,675	Yes	14,140	15,908	19,443	21,210
	Manica	9,000	17,692	Yes	14,154	15,923	19,461	21,230
	Nampula	7,000	18,452	Yes	14,762	16,607	20,297	22,142
	Niassa	7,000	17,879	Yes	14,303	16,091	19,667	21,455
	Sofala	9,000	18,518	Yes	14,814	16,666	20,370	22,222
	Tete	7,500	16,895	Yes	13,516	15,206	18,585	20,274
	Zambézia	7,000	18,372	Yes	14,698	16,535	20,209	22,046
Cow peas	Cabo Delgado	3,000	17,674	Yes	14,139	15,907	19,441	21,209
	Inhambane	4,000	19,440	Yes	15,552	17,496	21,384	23,328
	Manica	3,500	17,692	Yes	14,154	15,923	19,461	21,230
	Nampula	3,000	18,452	Yes	14,762	16,607	20,297	22,142
	Sofala	3,500	18,518	Yes	14,814	16,666	20,370	22,222
	Zambézia	3,000	18,372	Yes	14,698	16,535	20,209	22,046
Ginger	Maputo	10,000	22,678	Yes	24,946	20,410	27,214	18,142
	Manica	10,000	20,474	Yes	22,522	18,427	24,569	16,379
	Nampula	10,000	21,234	Yes	23,358	19,111	25,481	16,988
	Zambézia	10,000	21,155	Yes	23,270	19,039	25,385	16,924
Groundnuts, large	Cabo Delgado	6,500	21,577	Yes	17,262	19,419	23,735	25,892
	Manica	8,500	21,595	Yes	17,276	19,436	23,755	25,914
	Nampula	6,000	22,354	Yes	17,883	20,119	24,589	26,825
	Zambézia	6,000	22,274	Yes	17,819	20,047	24,501	26,729
Groundnuts, small	Cabo Delgado	7,000	16,600	Yes	13,280	14,940	18,260	19,920
	Manica	8,500	16,617	Yes	13,294	14,955	18,279	19,940
	Nampula	6,500	17,378	Yes	13,902	15,640	19,116	20,854
	Zambézia	6,500	17,298	Yes	13,838	15,568	19,028	20,758
Honey	Manica	35,000	58,268	Yes	47,509	53,447	65,325	71,263
	Maputo	45,000	60,471	Yes	49,272	55,431	67,749	73,908

Source: External Market Task Force (2004:23)

Annex Table 5. The biggest commercial seed markets in Africa

Country	Annual domestic sales (millions of US\$)
South Africa	217
Morocco	160
Egypt	140
Nigeria	120
Tunisia	70
Kenya	50
Zimbabwe	30
Zambia	15
Malawi	10
Uganda	6
Total	818

Source: GRAIN (2005:1)

Annex Table 6. Cost of importing insecticides from China to Nacala

	Insecticide A		Insecticide B		Insecticide C	
	Cost (\$/liter)	% of total	Cost (\$/liter)	% of total	Cost (\$/liter)	% of total
FOB price	3.89	61.7%	6.24	62.2%	11.62	56.8%
Freight	0.35	5.5%	0.35	3.5%	0.35	1.7%
Insurance	0.01	0.2%	0.01	0.1%	0.01	0.0%
Customs fees						
Duty	0.11	1.7%	0.17	1.6%	0.30	1.5%
Stamp/document fees	0.00	0.0%	0.00	0.0%	0.00	0.0%
Clearing Agent						
Fee	0.06	1.0%	0.10	1.0%	0.18	0.9%
Document	0.01	0.2%	0.02	0.2%	0.03	0.1%
VAT on fee only	0.01	0.2%	0.02	0.2%	0.03	0.1%
CFM	0.03	0.5%	0.04	0.4%	0.08	0.4%
THC (paid to shipping agent)	0.01	0.2%	0.02	0.2%	0.03	0.2%
Other payments	0.00	0.0%	0.00	0.0%	0.01	0.0%
Forwarding Agent						
Commission	0.00	0.1%	0.01	0.1%	0.01	0.1%
Subtotal (c.i.f. value)	4.49		6.97		12.65	
Markup	1.57	24.9%	2.72	27.1%	7.21	35.2%
Subtotal	6.06		9.69		19.87	
Transport cost						
Delivery to Montepuez (\$/liter)	0.09	1.4%	0.09	0.9%	0.09	0.4%
Price with delivery (\$/liter)	6.15		9.78		19.95	
Finance Charges	0.16	2.5%	0.25	2.5%	0.52	2.5%
Total delivered price (\$/liter)	6.31	100.0%	10.03	100.0%	20.47	100.0%
Markup as fraction of c.i.f. value		35.0%		39.0%		57.0%

Source: GSC (2005:37) plus calculations for the implicit markup on c.i.f. values.

Annex Table 7. Mozambique agricultural production of selected key crops, 1997-2003

Products	Production (tonnes)					
	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003
Beans	191,100	188,589	141,343	153,825	177,356	174,556
Cashew nuts	31,000	63,417	44,001	29,631	45,740	n.a.
Cassava	5,639,000	5,552,928	5,352,755	5,974,594	5,924,550	6,547,298
Cotton	91,088	116,716	35,365	71,048	74,000	75,098
Cotton fibre	31,007	35,746	12,200	23,500	23,000*	n.a.
Groundnuts	142,800	147,002	115,684	109,175	109,787	87,463
Maize	1,123,700	1,246,077	1,018,860	1,143,263	1,235,658	1,178,792
Millet	317,100	326,351	252,026	313,787	314,136	21,609
Molasses	n.a.	14,000	20,000	15,844	33,472	n.a.
Rice	191,200	186,086	157,936	166,945	167,925	117,483
Sorghum	53,300	61,278	45,949	61,602	55,760	n.a.
Sugar	n.a.	39,000	51,000	39,035	104,958	n.a.
Sugarcane (milled)	368,675	469,456	397,276	675,623	1,586,260	n.a.
Sweet potatoes						877,156
Tobacco	700	1,572	9,470	11,170	25,611	51,077

Sources: INE, CWG, INCAJU, IAM, INA, SNAP e MIC cited by the External Market Task Force. (2004:9).

n.a. = not available

* World Bank (2005:17)

Annex Table 8. *Selected African countries' membership in regional trade agreements*

	SADC	COMESA	SACU	CBI	EAC	IOC	WAEMU
SADC Member Countries							
Mozambique	•						
Botswana	•		•				
Lesotho	•		•				
South Africa	•		•				
Angola	•	•					
Congo, Dem. Rep. of	•	•					
Malawi	•	•		•			
Mauritius	•	•		•		•	
Seychelles	•	•		•		•	
Tanzania	•	•		•	•		
Zambia	•	•		•			
Zimbabwe	•	•		•			
Namibia	•	•	•	•			
Swaziland	•	•	•	•			
Other Countries							
Benin							•
Burkina Faso							•
Côte d'Ivoire							•
Guinea Bissau							•
Mali							•
Niger							•
Senegal							•
Togo							•
Djibouti		•					
Egypt		•					
Eritrea		•					
Ethiopia		•					
Sudan		•					
Burundi		•		•			
Comoros		•		•		•	
Kenya		•		•	•		
Madagascar		•		•		•	
Rwanda		•		•			
Uganda		•		•	•		

Source: Elborgh-Woyteck and Nagy (2000)

Notes: SADC = Southern African Development Community; COMESA = Common Market for Eastern and Southern Africa; SACU = Southern African Customs Union; CBI = Cross-Border Initiative; EAC = Commission for East African Cooperation; IOC = Indian Ocean Commission; WAEMU = West African Economic and Monetary Union.

Annex Table 9. Capital and direct costs of using two types of transport during one hour

Annex Table 3: Capital and direct costs of using two types of transport during one hour										
	Imported?	With a tractor				With buffalos				
		Unit value	Cost per hour			Unit value	Cost per hour			
		\$	\$	US \$	US \$	\$	\$	US \$	US \$	
		Col.*	Col.	(original estimates)	(revised estimates)	Col.*	Col.	(original estimates)	(revised estimates)	
Direct costs										
ACPM (diesel), \$ per gallon	yes	1.50	0.76	0.53	1.41					
Motor oil, ¼ of a gallon	yes	2.75	0.15	0.13	0.35					
Oil filter	yes	6.60	0.03	0.02	0.02					
Filter ACPM	yes	1.80	0.01	0.01	0.01					
Labour for changing oil	no	3.00	0.01	0.01	0.00					
Tractor operator	no	12.02	1.50	1.25	0.21					
Tractor maintenance/year	half	250.00	0.31	0.26	0.26					
Rations						0.73	0.25	***	0.21	0.21
Labour						1.75	0.22		1.09	0.18
Medicine/year	yes					24.00	0.04		0.03	0.03
Total direct costs, \$/hour			2.77	2.21	2.26		0.51		1.33	0.42
Capital costs										
Secondhand tractor	yes	6,000	1.00	0.83	0.83					
Buffalo	no					1,200	0.15		0.13	0.13
Harness and other gear	no					180	0.06		0.05	0.05
Wagon	yes	1,000	1.17	0.14	0.14	600	0.10		0.08	0.08
Total cost of investment		7,000	2.17	0.97	0.97	1,980	0.31		0.26	0.26
Grand total (\$/hour)				3.18	3.23				1.59	0.68
Ratio of costs with tractor versus buffalo									2.0	4.7
Expenses for imported inputs and equipment (value)				1.79	2.89				0.13	0.13
Expenses for imported inputs and equipment (%)				56.3%	89.4%				8.2%	19.0%
Minus value of milk and offspring for a female buffalo****						610			0.32	0.32
Adjusted grand total when using female buffaloes									1.27	0.36
Ratio of costs with tractor versus female buffalo									2.5	8.9

Fonte: Galindo (1997)

* in thousand pesos (Columbia)

** The revised values reflect price of petroleum products and the monthly minimum agricultural wage rate (\$32) in Mozambique in early 2006.

*** weighted cost for rations/hour considering that the animal works 200 days/year for 10 years of effective life

**** The estimates for the value of offspring and milk were derived from ratios in Galindo's text.

Annex Table 10. EU domestic support policies: Amber, blue and green boxes

<p>“Under the Uruguay Round Agreement on Agriculture (URAA), domestic support policies were categorized into three “boxes” (amber, blue, and green). The boxes are ranked by their presumed trade- and production-distorting effects, as follows:</p> <ul style="list-style-type: none"> • Amber box policies directly influence production decisions. An indicator called the Aggregate Measure of Support (AMS) measures the most trade-distorting domestic support. The AMS combines direct payments, input subsidies, and price support; the AMS is scheduled for reduction. • Blue box policies represent a special exemption from the reductions required of amber box policies. This exemption was allowed for payments tied to limits on production such as the EU’s compensatory payments that were paid on a fixed area and were based on historical area and yield. Many countries considered the blue box exemption to be a transitional measure, permitted until payments are restructured to qualify as green box policies. 	<ul style="list-style-type: none"> • Green box policies were those policies considered to have minimal or no effect on production or trade, including such activities as research, domestic food aid, environmental programs, certain crop insurance and income safety net programs, and payments not linked to production (“decoupled” payments). Green box policies were exempted from reduction commitments and were not subject to expenditure limits. <p>Under the 2003-04 CAP reform, direct payments meeting green box criteria are expected to be classified as green box outlays. Many EU direct payments are blue box payments; shifting them to the green box will shrink the EU’s blue box significantly. Amber box policies affected by the reform include support price reductions that will reduce the EU’s AMS.”</p> <p style="text-align: center;">◇◇◇</p> <p><i>Source: Kelch and Normile (2004:4)</i></p>
---	--

References

- Abdula, D. 2001. Comportamento dos mercados grossistas de grão de milho branco durante o ano 2000. Departamento de Análise de Políticas, Direcção de Economia, Ministério da Agricultura e Desenvolvimento Rural, Relatório 48P.
- Abdula, D. and Arlindo, P. 2002. Análise da comercialização agrícola nas zonas rurais de Moçambique: Implicações para estratégias de segurança alimentar e alívio à pobreza — Resultados do TIA 2002. PowerPoint presentation for the Departamento de Análise de Políticas, Direcção de Economia, Ministério da Agricultura e Desenvolvimento Rural. www.aec.msu.edu/agecon/fs2/mozambique/policypres/Mozambique_marketing_tia02-v4-Port-DT_DCA_PA.pdf
- Alston, J. et al. 2000. *A Meta-Analysis of Rates of Return to Agricultural R & D: Ex Pede Herculem?* International Food Policy Institute.
- Anderson, J. and Feder, G. 2004. Agricultural extension: Good intentions and hard realities. *World Bank Research Observer* 19(1).
- Aksoy, M. 2005. Global agricultural trade policies. In: Aksoy, M. and Beghin, J., eds. *Global Agricultural Trade and Developing Countries*. Washington, D.C.: World Bank. <http://siteresources.worldbank.org/INTGAT/Resources/GATfulltext.pdf>.
- Alberts, T. 2001. Malonda Programme: The role of medium- and large scale farming in the development of the Niassa province: Possibilities and constraints.
- Arndt, C. 2005. The Doha Trade Round and Mozambique. World Bank Policy Research Working Paper 3717. www.wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2005/09/15/000016406_20050915100216/Rendered/PDF/wps3717.pdf. Also forthcoming as Ch. 5 in *Putting Development Back into the Doha Agenda: Poverty Impacts of a WTO Agreement*, by Thomas W. Hertel and L. Alan Winters (eds.). Washington, D.C.: World Bank.
- Arndt, C.; Jensen, H.; Robinson, S.; and Tarp, F. 1999. Marketing margins and agricultural technology in Mozambique. Trade and Macroeconomics Division, International Food Policy Research Institute, discussion paper no. 43.
- Baffes, J. 2004. Cotton: Marketing setting, policies, issues, and facts. In: Aksoy, M. and Beghin, J., eds. *Global Agricultural Trade and Developing Countries*. Washington, D.C.: World Bank. <http://siteresources.worldbank.org/INTGAT/Resources/GATfulltext.pdf>.
- Bechtel, P. 2001. Land law and agricultural development in the Cabo Delgado Province of Mozambique and in Swaziland. Paper presented at the SARP Conference on Land Reform and Poverty Alleviation in Southern Africa, Pretoria, June 4 and 5.
- Beghin, J. et al. 2003. The cost of the United States sugar program revisited. *Contemporary Economic Policy* 21.
- Benfica, R. 2005. The economics of smallholder households in tobacco and cotton growing areas of the Zambezi Valley of Mozambique. Directorate of Economics, Ministry of Agriculture and Rural Development, Research Report 59E.
- Bias, C. and Donovan, C. 2003. Gaps and opportunities for agricultural sector development in Mozambique. Directorate of Economics, Ministry of Agriculture and Rural Development, Research Report 54E. <http://aec.msu.edu/fs2/mozambique/wps54e.pdf>.
- Boughton, D. et al. 2003. Cotton sector policies and performance in sub-Saharan Africa: Lessons behind the numbers in Mozambique and Zambia. Paper presented at the 25th International Conference of Agricultural Economists, August 16-22, Durban, South Africa.
- Brück, T.; FitzGerald, V.; and Grigsby, A. 2000. Enhancing the private sector contribution to post-war recovery in poor countries. University of Oxford International Development Centre, Queen Elizabeth House Working Paper 45(3). Accessed: 26/12/05, www2.qeh.ox.ac.uk/pdf/qehwp/qehwps45_3.pdf.
- Cambaco, S. 2002. The impact of new legislation in Mozambique. Land Redistribution in Southern Africa, Pretoria Symposium. www.fig.net/figtree/commission7/pretoria_2002/sym_LR_Pretoria_Paper_Cambaco.pdf.
- Castel-Branco, C.; Davenport, M.; Iacovone, L.; and Sulemane, J. 2004b. National assessment study of an Economic Partnership Agreement (EPA) between Mozambique and the European Union (EU).
- Chaplin, H. and Matthews, A.. 2005. Coping with the fallout for preference-receiving countries from EU sugar reform. Institute for International Integration Studies at Trinity College Dublin, Discussion Paper No. 100. www.tcd.ie/iis/documents/discussion/pdfs/iisdp100.pdf.
- Chauvin, S. and Gaulier, G. 2002. Regional trade integration in southern Africa. Centre d'Etudes Prospectives et d'Informations Internationales (CEPII), paper 2002-12 October.
- CIE (Centre for International Economics, Canberra). 2002. Targets for OECD sugar market liberalisation. Report prepared for the Global Alliance for Sugar Trade Reform and Liberalisation. Accessed: 12/4/06. www.thecie.com.au/publications/CIE-OECD_sugar_market_liberalisation.pdf
- CIMMYT (International Maize and Wheat Improvement Centre). 1994. Maize seed industries, revisited: Emerging roles of the public and private sectors. In: CIMMYT. *1993/94 World Maize Facts and Trends*. Mexico City: CIMMYT.
- Clarke, G. 2005. Beyond tariffs and quotas: Why don't African manufacturers export more? Report for the World Bank's Development Research Group, Competition Policy and Regulation Section. www1.worldbank.org/rped/documents/wps0505.pdf.
- Commission of European Communities. 2005. Reforming the European Union's sugar policy: Update of impact assessment [SEC(2003) 1022]. Commission Staff Working Document SEC(2005) 808, Brussels, June 22. www.eu.int/comm/agriculture/capreform/sugar/impact_en.pdf.
- Coughlin, P. 2001. SADC study of the textile and garment industries: Mozambique. Study commissioned by the Southern African Development Community.
- Coughlin, P.; Mlay, G.; and Cumbe, F. 2006. Animal draught power for the sugar industry in sub-Saharan Africa? A pre-pilot study. A proposal prepared by EconPolicy Research Group, Ltd.
- Council of the European Union. 2006a. Council Regulation 05588/06 on the common organisation of the markets in the sugar sector. Interinstitutional File 0118/2005 (CNS). www.sugartraders.co.uk/st05588.en06.pdf.

- Council of the European Union. 2006b. Council Regulation 05588/06 on the common organisation of the markets in the sugar sector: Addendum 6312/06(ADD 1) to the report. Interinstitutional Files 2005/0118 (CNS) 2005/0119 (CNS) 2005/0120 (CNS), www.sugartraders.co.uk/st06312-ad01.en06.pdf.
- Cramer, C. 2001. Privatisation and adjustment in Mozambique: A 'hospital pass'? *Journal of Southern African Studies* 27(1).
- SANAGRI. 2002. Review of Danida-supported Extension and Research Activities within the Agricultural Sector Programme Support (ASPS): Final Report—Mozambique. Report commissioned by the Mozambique Ministry of Foreign Affairs and Danida, Ref. No. 104.Moz.805-1.
- DAP (Department of Policy Analysis, Ministry of Agriculture and Pescas). 1999. Avaliação dos impedimentos para o desenvolvimento do sector dos insumos agrícolas e veterinários. Draft report.
- DAP. 2001. Para um regulamento da cultura do tabaco que contribua para o crescimento e desenvolvimento do subsector. Internal report, Departamento de Análise de Políticas, Direcção de Economia, Ministério da Agricultura e Desenvolvimento Rural.
- Debrah, S. 2000. *From State Monopoly to Private Sector Oligopoly: African Agricultural Input Markets in Crisis*. Lome: International Fertilizer Development Centre.
- Devadoss, S. and Kropf, J. 1996. Impacts of trade liberalization under the Uruguay Round on the World sugar market. *Agricultural Economics* 15.
- Dominguez, C.; Jones, R.; and Waterhouse, R. 2005. The impact of HIV/AIDS on seed security in southern Mozambique. www.ifpri.org/events/conferences/2005/durban/papers/dominguezWP.pdf.
- Eicher, C. 2004. Mozambique: Building African models of agricultural extension. In: W. Riveira and G. Alex, eds. *National Strategy and Reform Process: Case Studies of International Initiatives*, vol. 5 of *Extension Reform for Rural Development*, Discussion Paper 12, Agriculture and Rural Development Department, World Bank. Washington, D.C.: World Bank. [http://lnweb18.worldbank.org/ESSD/ardext.nsf/11ByDocName/ExtensionReformforRuralDevelopmentVolume5NationalStrategyandReformProcess/\\$FILE/Extension_Reform_V5_final.pdf](http://lnweb18.worldbank.org/ESSD/ardext.nsf/11ByDocName/ExtensionReformforRuralDevelopmentVolume5NationalStrategyandReformProcess/$FILE/Extension_Reform_V5_final.pdf).
- Elborgh-Woyteck, K. and Nagy, P. 2000. Trade and trade policies in eastern and southern Africa. IMF Occasional Paper 196.
- Elobeid, A. and Beghin, J.C. 2004. Multilateral trade and agricultural policy reforms in sugar markets. Working Paper 04-WP 356, Center for Agricultural and Rural Development, Iowa State University.
- van Empel, G. 2001. Strategy for the development of commercialisation structure for the agricultural sector and rural banking system in Mozambique. Quelimane(?). Rabo International Advisory Service for UNAC, AGRARIUS, and ORAM, June.
- Equipe Técnica do SIMA. 2001. Informação para o sector privado agrícola: Novos serviços do SIMA em apoio aos produtores, comerciantes e processadores do sector agrícola. Departamento de Análise de Políticas, Direcção de Economia, Ministério da Agricultura e Desenvolvimento Rural, Relatório no. 46P.
- Ernst & Young and EconPolicy Research Group, Ltd. 2005. Reformulação da política e estratégias industriais em Moçambique. Report prepared for the Ministry of Industry and Commerce.
- Evenson, R. 2001. Economic impacts of agricultural research and extension. In: Gardner, B. and G. Rausser, eds. 2001. *Handbook on Agricultural Economics*. Amsterdam: Elsevier.
- External Market Task Force. 2004. Study on the export marketing prospects of six selected Mozambican commodities for the South African market: Main Report. Study supported by the EC/FAO Facility for the Provision of Consultancy Services and the Marketing Management Assistance Project MIC/FAO/EC.
- Fabiosa, J. et al. 2003. Agricultural markets liberalization and the Doha Round. In: IAAE, ed.. *Proceedings of the 25th International Conference of Agricultural Economists (IAAE)*. Document Transformation Technologies
- FAO (Food and Agriculture Organization of the United Nations). 1982. The agricultural economy of Mozambique, FAO, Maputo, Mimeo.
- FAO, Food and Beverages Group, Commodities and Trade Division. 2000. Review of the Mozambique sugar sub-sector policy: Final report.
- FAO, Emergency Operations and Rehabilitation Division. 2004. Mozambique: Support to small-holding farming production through agricultural input trade fairs (ITFS) in the southern and central provinces. OSRO/MOZ/301/UK project report.
- FAO. 2005. FAO/WFP Crop and Food Supply Assessment Mission to Mozambique. Special report for the FAO Global Information and Early Warning System on Food and Agriculture, World Food Programme. www.fao.org/documents/show_cdr.asp?url_file=/docrep/008/J5510e/J5510e00.htm
- Ferrantino, M. 2006. Quantifying the trade and economic effects of non-tariff measures. OECD Trade Policy Working Paper No. 28.
- Fox, L.; Bardasi, E. and van den Broeck, K. 2005. Evolution of poverty and inequality in Mozambique, 1996/7-2002/3. Background paper for the 2005 Country Economic Memorandum. Washington D.C.: World Bank. Processed.
- Galindo, W. circa 1998. La tracción animal. Research paper for the Centro para la Investigación de Sistemas Sostenibles de Producción Agropecuaria, Cali, Colombia. www.cipav.org.co/cipav/resrch/index.htm.
- Gemo, H.; Eicher, C.; and Teclemanrrian, S. 2005. *Mozambique's Experience in Building a National Extension System*. East Lansing: Michigan State University Press.
- Gergely, N. 2005. Economic analysis of comparative advantage for major agricultural cash crops in Mozambique. Draft consultant report for the 2005 Rural Development Strategy. Washington D.C.: World Bank. Processed.
- GDS (Global Development Solutions, LLC). 2005. Value chain analysis for strategic sectors in Mozambique. Report prepared for The Enterprise Development Project (PoDE).
- Gillson, I.; Hewitt, A.; and Page, S. 2005. Forthcoming Changes in the EU Banana/Sugar Markets: A Menu of Options for an Effective EU Transitional Package. Report for the Overseas Development Agency. www.odi.org.uk/iedg/projects/EU_banana_sugar_markets/SUGARreport.pdf
- Gordon, A. 2000. Improving smallholder access to purchased inputs in sub-Saharan Africa. Natural Resources Institute, University of Greenwich, Policy Series 7.
- GRAIN. 2005. Africa's seed laws: Red carpet for the corporations. *Seedling* (July). www.grain.org/seedling_files/seed-05-07-.pdf. Accessed: 22/1/06.

- Hanlon, J. 2004. Renewed land debate and the 'cargo cult' in Mozambique. *Journal of Southern African Studies* 30(4). [www.open.ac.uk/personalpages/j.hanlon/HanlonMozLandJSAS30\(3\)2004.pdf](http://www.open.ac.uk/personalpages/j.hanlon/HanlonMozLandJSAS30(3)2004.pdf).
- Hanlon, J. 2006. The tobacco debate: Priority for factories or peasants? *O País*, May 19. www.open.ac.uk/technology/mozambique/pics/d60678.doc.
- Hanlon, J. and Smart, T. 2006. The Manica miracle is over. *O País*, April 28, pp. 3-4.
- Holmén, H. 2005. Spurts in production: Africa's limping Green Revolution. In: Djurfeldt, G. et al. *The African Food Crisis: Lessons from the Asian Green Revolution*. Cambridge, Massachusetts: CABI Publishing.
- HORUS Enterprises. 2005. Estudo complementar para o melhoramento da estratégia no sector do algodão em Moçambique. Study commissioned by the National Cotton Institute.
- Howard, J. et al. 1998. What makes agricultural intensification profitable for Mozambican smallholders? An appraisal of the inputs subsector and the 1996/97 DNER/SG2000 Program. Department of Agricultural Economics, Michigan State University, International Development Working Paper 69.
- Howard, J. et al. 1999. Progress and problems in promoting high-external-input technologies in sub-Saharan Africa: The Sasakawa-Global 2000 Experience in Ethiopia and Mozambique. Paper for the Annual Meetings of the American Agricultural Economics Association, Nashville, Tennessee, August 8-11.
- Howard, J. et al. 2000. Comparing yields and profitability in MADER's high- and low-input maize programs: 1997/98 survey results and analysis. Directorate of Economic, Ministry of Agriculture and Rural Development, Research Report no. 39E.
- Howard, J. et al. 2001. Constraints and strategies for the development of the seed system in Mozambique. Directorate of Economics, Ministry of Agriculture and Rural Development, Research Report no. 43E.
- Huan-Niemi, E. and Kerkelä, L. 2005. Reform in the EU sugar regime: Impact on the global sugar markets. Paper presented at the XIth Congress of European Association of Agricultural Economists, Copenhagen, August 24-27. www.eaae2005.dk/contributed_papers/s58_301_Niemi&Kerkel.pdf.
- IFAD (International Fund for Agricultural Development). 2003. *Agricultural Marketing Companies as Sources of Smallholder Credit in Eastern and Southern Africa: Experiences, Insights and Potential Donor Role*. Rome: IFAD. www.ifad.org/ruralfinance/policy/pf.pdf.
- IFDC (International Fertilizer Development Centre). 2000. A Strategic Framework for African Agricultural Input Supply System Development. Report commissioned by the US Agency for International Development, www.afamin.net/documents/AITA%202002%20-%20IFDC%20FASEPE%20Strategic%20Framework.pdf.
- ILO/EIP (Employment Intensive Programme, International Labour Organization). 2005. Mozambique: Feeder Roads Programme. www.ilo.org/public/english/employment/recon/eiip/countries/africa/mozambique.htm
- INIA-DIA (Instituto Nacional de Investigação Agrícola, Direcção de Investigação Agrícola). 1999. *Mapa Hidrometrológico de Moçambique*.
- Issufo, A. 2003. Current legislative and policy changes and their effect on forestry and land use in Mozambique. Paper prepared for the First International Workshop on Promoting Common Property in Africa: Networks for Influencing Policy and Governance of Natural Resources (Co-Govern), 6-9 October, Cape Town.
- Jayne, T. 1999. Successes and challenges of food market reform: Experiences from Kenya, Mozambique, Zambia, and Zimbabwe. Department of Agricultural Economics, Michigan State University, International Development Working Paper 72.
- Kanji, N. et al. 2004. Liberalisation, Gender and Livelihoods: The Mozambique Cashew Nut Case. Report commissioned by the Royal Netherlands and Irish Embassies in Maputo. www.iied.org/NR/agbioliv/ag_liv_documents/mozam-Engsection.pdf.
- Kastler, G. 2005. Europe's seed laws: Locking out farmers. *Seedling* (July). www.grain.org/seedling_files/seed-05-07-3.pdf, Accessed: 24/1/06.
- Kelly, V. 2005. Farmers' demand for fertilizer in sub-Saharan Africa. Department for Agricultural Economics, Michigan State University. www.aec.msu.edu/agecon/fs2/inputs/documents/wb_demand_paper_august_18_2005_final_full.pdf. Accessed: 6/2/06.
- Kelch, D. and Normile, M. 2004. CAP reform of 2003-04. *Electronic Outlook Report from the Economic Research Service*, WRS-04-07. <http://ers.usda.gov/publications/WRS0407/wrs0407.pdf>.
- KIT (Royal Tropical Institute). 2000. O ProAgri em Moçambique: Reforma institucional do sistema de investigação agrária. Report for the Ministry of Agriculture and Rural Development.
- Koo, W.. 2003. Alternative United States and EU sugar trade liberalization policies and their implications. *Review of Agricultural Economics* 24.
- Koo, W. and Taylor, R. 2005. 2005 outlook of the U.S. and world sugar markets, 2004-2013. Center for Agricultural Policy and Trade Studies, Department of Agribusiness and Applied Economics, North Dakota State University, Agribusiness & Applied Economics Report No. 561. www.ag.ndsu.nodak.edu/capts/documents/AGReport561P.pdf.
- Koizumi, T. 2003. The Brazilian ethanol programme: Impacts on world ethanol and sugar markets. FAO Commodity and Trade Policy Research Working Paper No. 1. <ftp://ftp.fao.org/docrep/fao/006/ad430e/ad430e00.pdf>.
- Kydd, J. et al. 2002. Agricultural development and pro-poor economic growth in sub-Saharan Africa: Potential and policy. Imperial College Wye, Imperial College of Science, Technology and Medicine, ADU working paper 02/04. Accessed 25/1/06: www.imperial.ac.uk/agriculturalsciences/research/sections/aebm/projects/poor_ag_downloads/africagrjun02.pdf.
- KPMG. 2005. *Business Confidence Index in Mozambique*. Maputo: KPMG.
- Kyle, S. 2003. A brief overview of Mozambique's rural development and the role of US assistance. Department of Applied Economics and Management, Cornell University, Staff Paper SP 2003-04.
- Langyintuo, A. 2004. Factors limiting profitability of the seed sector in southern Africa: A sector survey report. International Maize and Wheat Improvement Center, Strengthening Seed Marketing Incentives in Southern Africa to Increase the Impact of Maize Breeding Research Project. www.cimmyt.org/gis/rfseedsafrica/documents/reports/informal_seed_sector_study.pdf, Accessed: 24/1/06.
- Lasstria-Cornheil, S. 1997. Impact of privatisation on gender and property rights in Africa. *World Development* 25(8).

- Lewis, J.; Robinson, S.; and Thierfelder, K. 2002. Free trade agreements and the SADC economies. World Bank, Africa Region WPS 27.
- Libombo, M. and Uaiene, R. 1999. A cadeia de sementes em Moçambique: Limitantes encontradas desde a libertação da semente melhorada, sua produção e distribuição. Seminário sobre Sistema Nacional de Sementes, Maputo, June 16 and 17.
- Lincoln, D. 2006. Beyond the plantation :Mauritius in the global division of labour. *Journal of Modern African Studies* 44(1).
- LMC/OPM. 2004. Safeguarding the benefits of the Sugar Protocol to ACP countries. Report prepared for CTA, Netherlands, LMC International and Oxford Policy Management.
- LMC International, Ltd. 2006a. An adaptation strategy for the Mozambican sugar sector. Report for Agriculture Promotion Centre, Ministry of Agriculture, Maputo.
- LMC International, Ltd. 2006b. Appraisal of the Impact of Sugar Pricing Policy and Investment in the Sugar Industry of Mozambique. Report for Agriculture Promotion Centre, Ministry of Agriculture, Maputo.
- Loening, J. and Perumalpillai-Essex, J. 2005. Agriculture and rural poverty in Mozambique: Dimension, profiles and trends. Background paper for the 2005 *Rural Development Strategy*. Washington D.C.: World Bank. Processed.
- Macamo, J. 2000. Barreiras administrativas ao investimento em Moçambique: Lições aprendidas da experiência de investidores recentes. Gabinete de Estudos (Ministério de Plano e Finanças) discussion paper 17. Also published in *A Economia Moçambicana Contemporânea: Ensaio* by C. Rolim, A. Franco, B. Bolnick and P. Andersson, eds. 2002. Maputo: Imprensa Universitária.
- MacEwan, M. 2004. HIV and AIDS and food and nutrition security linkages in Mozambique. Background document for mainstreaming HIV and AIDS considerations into the National Food and Nutrition Security Strategy, prepared for the Technical Secretariat for Food and Nutrition Security (SESTAN). www.sarpn.org.za/documents/d0001192/P1323-Mozambique_Setsan_HIV_FNS_Sept2004.pdf.
- Mackenzie, F. 1990. Gender and land rights in Murang'a District, Kenya. *Journal of Peasant Studies* 17(4).
- MADER (Ministério de Agricultura e Desenvolvimento Rural). 2003a. Alguns aspectos da comercialização agrícola: Acesso de produtores e integração nos mercados. Contribuição ao *Relatório Conceitual*, nota de discussão para MADER ProAgri2.
- MADER. 2003b. *Trabalho de Inquérito Agrícola ao Sector Familiar, 2002–2003*. CD ROM.
- MADER. 2004. *Strategy Document: ProAgri II*. Maputo: MADER.
- Magnay, J. 1999. Developing the smallholder market for fertilizer in Uganda. In: Gordon, A. and Goodland, A., eds. *The Use of Purchased Inputs by Smallholders in Uganda. Proceedings of a workshop held at Mukono, Uganda, 4–5 February 1999*. Chatham, UK: Natural Resources Institute..
- Marrule, H. 1998. Land-poor in a “land-abundant” setting: Unraveling a paradox in Mozambique. Research report, National Directorate of Agricultural Economics, Ministry of Agriculture and Fishing, Maputo, reprint of MSc Plan B Paper, Department of Agricultural Economics, Michigan State University.
- Massingue, J. et al. 2004. Sector comercial de sementes: Progressos e perspectivas de desenvolvimento. Direcção de Economia, Ministério de Agricultura e Desenvolvimento Rural, Relatório 55P.
- Mather, D. et al. 2004. Household responses to prime age adult mortality in rural Mozambique: Implications for HIV/AIDS mitigation efforts and rural economic development policies. Paper prepared for the Center for the Study of African Economies Conference, Oxford. www.csae.ox.ac.uk/conferences/2004-GPRaHDiA/papers/4r-MatherEtAl-CSAE2004.pdf.
- Mauritius. 2005. A Roadmap for the Mauritius sugarcane industry for the 21st century. www.gov.mu/portal/sites/moasite/download/roadmap.pdf.
- Mole, P. 2000. Smallholder cashew development opportunities and linkages to food security in Nampula Province, Mozambique: Summary of findings and implications for policy, research and extension efforts. Directorate of Economics, Ministry of Agriculture and Rural Development, Research Report no. 42E.
- Mole, P. 2005. Estudo sobre experiências de facilitação de ligações de pequenos produtores ao mercado no centro e norte de Moçambique. Report for PAMA (Programa de Apoio para os Mercados Agrícolas).
- Mozambique. 2001a. Regulamento sobre Produção, Comércio, Controlo de Qualidade e Certificação de Sementes.
- Mozambique. 2001b. *Plano de Acção para a Redução da Pobreza Absoluta, 2001-2005 (Parpa): Documento de Estratégia e Plano de Acção para a Redução da Pobreza e Promoção do Crescimento Económico*. Maputo: Conselho de Ministros do Governo de Moçambique.
- Mussa, C.; Vossenaar, R.; and Waniyala, N. 2000. Strengthening developing countries' capacities to respond to health, sanitary and environmental requirements: Scoping paper for eastern and southern Africa. Report prepared for UNCTAD about the experience of Kenya, Mozambique, the United Republic of Tanzania and Uganda.
- Nasir, J. et al. 2003. *Mozambique Industrial Performance and Investment Climate 2003*. Maputo: The Confederação das Associações Económicas de Moçambique (CTA), Centro de Promoção de Investimentos (CPI), Regional Program on Enterprise Development (RPED), Africa Private Sector Group, and the World Bank.
- Nathan Associates. 2004a. *Mozambique: Diagnostic Trade Integration Study—Main Report*. Study for the Ministry of Industry and Commerce funded by the Trade Capacity Building Project, U.S. Agency for International Development.
- Nathan Associates. 2004b. *Mozambique: Diagnostic Trade Integration Study*, vol. 2. Study for the Ministry of Industry and Commerce funded by the Trade Capacity Building Project, U.S. Agency for International Development.
- Norfolk, S. and Liversage, H. 2001. Land reform and poverty alleviation in Mozambique. Paper for the Southern African Regional Poverty Network, Human Sciences Research Council. www.sarpn.org.za/CountryPovertyPapers/Mozambique/LandReform/LandReform.pdf.
- Norfolk, S. et al. 2003. The ‘new’ communities: Land tenure reform and the advent of new institutions in Zambézia Province, Mozambique. Research Paper #12 for the series “Sustainable Livelihoods in Southern Africa: Institutions, Governance and Policy Processes”, www.ids.ac.uk/slsa.
- Oehmke, J.; Anandajayasekeram, P.; and Masters, W. 1997. Agricultural technology development and transfer in Africa: Impacts achieved and lessons learned. USAID, Office of Sustainable Development, Bureau for Africa, SD Publication Series. http://pdf.dec.org/pdf_docs/pnacb618.pdf.

- Oehmke, J. and Crawford, E. 1993. The impact of agricultural technology in sub-Saharan Africa: A synthesis of symposium findings. Michigan State University, Department of Agricultural Economics, International Development Paper #14
- Ofiço, A. and Tschirley, D. 2003. An overview of the cotton sub-sector in Mozambique. Report for the Collaborative Research Project on Competition and Coordination in Cotton Market Systems in Southern and Eastern Africa. Accessed: 27/1/06, www.imperial.ac.uk/agriculturalsciences/research/sections/aebm/projects/cotton_downloads/sysovmoz.pdf.
- Orellana, C. 2006. Brazil and Japan give fuel to ethanol market. *Nature Biotechnology* 24(3).
- Otsuki, T.; Wilson, J.; and Sewadeh, M. 2000. Saving two in a billion: A case study to quantify the trade effect of European Food Standards on African exports. Washington, D.C.: World Bank.
- Owens, R.; Hoddinott, J.; and Kinsey, B. 2003. The impact of agricultural extension on farm production in resettlement areas of Zimbabwe. *Economic Development and Cultural Change* 51(2).
- Perumalpillai-Essex, J. 2005. Impacts of extension services in rural Mozambique. Report by ECON Analysis for the Environment, Rural and Social Development Department, Africa Region, World Bank.
- Pearce, D. 2003. Buyer and supplier credit to farmers: Do donors have a role to play? "Paving the Way Forward for Rural Finance", An International Conference on Best Practices organized by the MSU Agricultural Economics Department, June 5, Washington, D.C. www.basis.wisc.edu/live/rfc/cs_15b.pdf, Accessed: 6/2/06.
- Pitoro, R. et al. 2001. Desempenho do sector algodoeiro ao nível da machamba em Nampula: Situação actual e perspectivas para o seu melhoramento. Direcção de Economia, Ministério de Agricultura e Desenvolvimento Rural, Relatório 47P.
- la Rocha, M. 2003. The Cotonou Agreement and its implications for the regional trade agenda in eastern and southern Africa. World Bank Policy Research Working Paper 3090.
- Rohrbach, D. et al. 2001. Investment priorities for the development of Mozambique's seed system. Directorate of Economics, Ministry of Agriculture and Rural Development, Research Report 44E.
- Rohrbach, D. and Howard, J. 2004. *Seed Trade Liberalization and Agro-Biodiversity in Sub-Saharan Africa*. Proceedings of a workshop at Matopos Research Station, Bulawayo, Zimbabwe, 5-6 Dec 2002. Bulawayo: ICRISAT. www.aec.msu.edu/agecon/fs2/inputs/documents/j_381_2004_msu_proceedings.pdf, Accessed: 25/1/06.
- Roseboom, J.; Beintema, N.; and Mitra, S. 2003. Building impact-oriented R&D institutions. Background Paper No. 3 commissioned by the InterAcademy Council (IAC) Study Panel on Science and Technology Strategies for Improving Agricultural Productivity and Food Security in Africa. www.interacademycouncil.net/Includes/DBLink.asp?ID=9063.
- Rohter, L. 2006. With big boost from sugar cane, Brazil is satisfying its fuel needs. *New York Times*, 10/4/2006, www.nytimes.com/2006/04/10/world/americas/10brazil.html?_r=1&oref=slogin.
- Sandrey, R. 2004. Non-tariff measures facing exports from South and Southern Africa. TIPS Working Paper 3-2004. Accessed: 11/4/06. www.tips.org.za/research/item.asp?ID=757&WebType=Papers.
- Santos, A. et al. 2002. Passado, presente e futuro do Sistema de Informação de Mercados Agrícolas (SIMA). Departamento de Análise de Políticas, Direcção de Economia, Ministério da Agricultura e Desenvolvimento Rural, Relatório 50P.
- da Silva, G. and Carrilho, L. 2003. Bridging the standards divide: A case study and action plan for Mozambique. In: Wilson, J. and Abiola, V., eds. *Standards & Global Trade: A Voice for Africa*. Washington, D.C.: World Bank.
- Sheales, T. et al. 1999. Sugar international policies affecting market expansion. ABARE Research Report 99.14, Canberra, Australia.
- Skully, D. 2001. Economics of Tariff-Rate Quota Administration. Technical Bulletin No. TB 1893, Economic Research Service, U.S. Department of Agriculture. Accessed: 13/4/06. www.ers.usda.gov/publications/tb1893/tb1893b.pdf.
- de Sousa, E. 2005. Mozambique: Contract farming and supply chain financing—Issues and challenges. World Bank, Agriculture, Environment, and Social Development Unit, Country Department 2, Africa Region, report 33406.
- Sumner, D. circa 2003. A quantitative simulation analysis of the impacts of U.S. cotton subsidies on cotton prices and quantities. www.mre.gov.br/portugues/ministerio/sitios_secretaria/cgc/analisequantitativa.pdf.
- Swinbank, A. 2005. The evolving CAP, pressures for reform, and implications for trade policy. Paper for the Australian Agricultural and Resource Economics Society's pre-conference workshop on Trade Policy Reform and Agriculture: Prospects, Strategies and Implications, Coffs Harbour, NSW, February 8.
- Strachan, L. 1994. Agricultural marketing and input supply. Mozambique Agriculture Sector Survey Working Paper, World Bank.
- Tarp, F. et al. 2002. Facing the development challenge in Mozambique: An economy-wide perspective. International Food Policy Research Institute, Research Report 126. Accessed: 23/12/05: www.ifpri.org/pubs/abstract/126/rr126.pdf.
- Tesfai, M. 1991. The three phases and many faces of MONAP: A presentation of the Mozambique-Nordic Agricultural Development Programme. Report by Querren AB Consulting Services for the Ministry of Agriculture, Maputo.
- Tique, C. 2002. Rural land markets in Mozambique: Its impact on land conflicts. Paper presented at SARPEN Workshop on Land Markets and Poverty in Moçambique, April 5, Maputo, Hotel Rovuma. www.sarpen.org.za/EventPapers/mozambique_april2002/tique/rural_land_markets.pdf.
- Toro, A. and Nhantumbo, A. 1999. Animal traction in Mozambique: Results from a survey of small-scale farmers. In: Starkey, P. and Kaumbutho, P. (eds). *Meeting the Challenges of Animal Traction. A Resource Book of the Animal Traction Network for Eastern and Southern Africa (ATNESA)*. Harare, Zimbabwe: Intermediate Technology Publications, London. www.atnesa.org.
- Tripp, R. 2003. Strengthening the Enabling Environment for Agricultural Technology Development in Sub-Saharan Africa. Overseas Development Institute, Working Paper 212. www.odi.org.uk/publications/working_papers/wp212.pdf, Accessed: 6/2/06.
- Tschirley, D.; Zulu, B.; and Shaffer, J. 2004. Cotton in Zambia: An assessment of its organization, performance, current policy initiatives, and challenges for the future. Food Security Research Project working paper no. 10, www.aec.msu.edu/agecon/fs2/zambia/index.htm.
- Tschirley, D.; Ofiço, A.; and Boughton, D. 2005. Mozambique country study. Collaborative Research Project on Competition and Coordination in Cotton Market Systems in Southern and Eastern Africa.
- UN (United Nations, Department of Economic and Social Affairs). 2005. *World Population Prospects: The 2004 Revision*. <http://esa.un.org/unpp>.

- UNDP (United Nations Development Programme). 2005. *Human Development Report 2005: International Cooperation at a Crossroad—Aid, Trade and Security in an Unequal World*. New York: UNDP.
- UNFCCC (United Nations Framework Convention on Climate Change). 2006. Kyoto Protocol: Status of ratification. (last updated 18 April 2006). http://unfccc.int/files/essential_background/kyoto_protocol/application/pdf/kpstats.pdf.
- Varajidás, B. 2005. Contract farming's credit schemes as an alternative credit source for the smallholders: A case study from Mozambique. Masters Thesis, Economics Institute, University of Oslo. <http://wo.uio.no/as/WebObjects/theses.woa/wa/these?WORKID=28342>
- Virtanen, P. 2004. The politics of law in Mozambique: Customary authority and changing premises of legal reform. *International Journal for the Semiotics of Law* 17.
- Visker, C.; Rutland, D.; and Dahoui, K. 1996. *The Quality of Fertilizers in West Africa (1995)*. Lome: IFDC.
- Walker, T. et al. 2004. Determinants of rural income, poverty, and perceived well-being in Mozambique in 2001-2002. Economics Directorate, Ministry of Agriculture and Rural Development, Research Report 57E.
- Warner, J. and Campbell, D. 2000. Supply response in an agrarian economy with non-symmetric gender relations. *World Development* 28(7).
- Waterhouse, R. 2004. The impact of HIV/AIDS on farmers' knowledge of seed: Case study of Ckókwè District, Gaza Province, Mozambique. Research report for the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). www.fao.org/sd/links/documents_download/ImpactHIVAIDSknowledgeofseed.pdf. (see also Dominguez, Jones and Waterhouse 2005)
- WEF (World Economic Forum). 2005. *Global Competitiveness Report 2005-2006*. New York: Palgrave MacMillan.
- Whitehead, A. 2006 (forthcoming). The gendered impacts of liberalisation policies on African agricultural economies and rural livelihoods. Draft working paper prepared for the UNRISD report *Gender Equality: Striving for Justice in an Unequal World*. www.unrisd.org/unrisd/website/document.nsf/ab82a6805797760f80256b4f005da1ab/d5b4fe38226fea6fc125706e00345465/%24FILE/whitehea.pdf.
- Wohlgenant, M. 1999. Effects of Trade Liberalization on the World Sugar Market. Rome: FAO
- World Bank. 1996. Mozambique agricultural sector memorandum, AFTA1. Washington, D.C.
- World Bank. 2002. Making Monterrey work for Africa: New study highlights dwindling aid flows, mounting challenges. News Release No. 2002/273/S.
- World Bank. 2003a. Mozambique country assistance strategy. Memorandum of the president of the International Development Association, International Finance Corporation and the Multilateral Investment Guarantee Agency to the Executive Directors on a Country Assistance Strategy for the Republic of Mozambique, Report No. 26747-MOZ.
- World Bank. 2003b. *Standards and Global Trade: A Voice for Africa*. Washington, D.C.: World Bank.
- World Bank. 2004a. The World Bank and Mozambique: 20 years of collaboration. <http://siteresources.worldbank.org/intmozambique/resources/WB20anos.pdf>.
- Hoekman, B. 2004b. The World Bank trade research program: Summary and synthesis. Development Economics Research Group, World Bank. http://siteresources.worldbank.org/intranettrade/resources/topics/dec_summary_activities_apr04.pdf.
- World Bank. 2005a. *Mozambique Country Economic Memorandum: Sustaining Growth and Reducing Poverty*. Report 32615-MZ.
- World Bank. 2005b. *Mozambique Agricultural Development Strategy: Stimulating Smallholder Agricultural Growth*. Report No. 32416-MZ, draft of September 19.
- World Bank. 2005c. Mozambique: Country brief. <http://web.worldbank.org/wbsite/external/countries/africaext/mozambiqueextn/0,,menuPK:382142~pagePK:141132~piPK:141107~theSitePK:382131,00.html>
- World Bank and Republic of Mozambique. 1996. *Mozambique: Policy Framework Paper 1996-98*. Maputo: Republic of Mozambique.