PN-AAM-718/62
ISN-28099

Letter Agreement
obligation number:
7425056

MOROCCO

PORT AND INLAND CERALS STORAGE

PREFEASIBILITY STUDY

December, 1982

International Development Cooperation Agency
U.S. Trade and Development Agency

MOROCCO

PORT AND INLAND CEREALS STORAGE

PREFEASIBILITY STUDY

Foreign Agricultural Service
U.S. Department of Agriculture

December, 1982

MOROCCO
PORT AND INLAND CEREALS STORAGE
PREFEASIBILITY STUDY

Table of Contents

Page No.

Summary and Recommendations..... vii
Need for Improvement and Expansion..... vii
Economic Feasibility of Proposed Expansion at the Ports..... vii
Economic Feasibility of Proposed Expansion Inland..... viii
Potential for U.S. Equipment Sales..... ix
Areas for Further Study..... ix

I. INTRODUCTION..... 1

A. Nature of the Study..... 1
B. Overview of Agriculture..... 1

II. CEREALS SUPPLY AND DEMAND..... 2

A. Domestic Production..... 2
B. Demand for Cereals..... 2
C. Cereal Imports..... 6

III. STORAGE, MARKETING AND DISTRIBUTION..... 8

A. Port Storage Facilities..... 8
B. Inland Facilities..... 15
C. Location and Capacity of Flour Mills..... 20
D. Cereal Transport Patterns..... 20

IV. INSTITUTIONAL STRUCTURE..... 22

A. Overall Coordination..... 22
B. Price and Subsidization Mechanisms..... 24
C. Internal Transport..... 25
1. National Transport Office..... 25
2. National Railroad Office..... 27

V. CURRENT PLANS FOR [illegible]..... 30

Page No.

VI. ECONOMIC FEASIBILITY OF PROPOSED EXPANSION..... 32

A. Utilization of Existing Capacity..... 32
1. Port Facilities..... 32
2. Inland Facilities..... 35
B. Criteria for selecting port locations..... 35
C. Cost of Constructing and Operating New Port Facility..... 38
D. Cost of Inland Storage..... 38

ANNEX

A. Principal Contacts..... 46

List of Tables

		Page No.
Table 2.1	Morocco: Total Cereal Production and Imports 1971/72 to 1982/83	3
2.2	Morocco: Durum, Soft Wheat and Barley Production and Imports 1971/72 to 1982/83	4
2.3	Distribution of Cereal Consumption 1980	5
2.4	Wheat Imports by Source of Supply (July/June)	7
3.1	Port Activities - 1981	10
3.2	Port Equipment, Infrastructures, and Superstructures Relating to the Storage and Handling of Bulk Cereal Products	11
3.3	Inland Storage Capacity by Type and Organization	15
3.4	Province Level Cereal Consumption, Production and Storage Capacity 1981/82	16
3.5	Cereal Supply/Demand Balance by Province	18
3.6	Capacity and Location of Moroccan Flour Mills	21
4.1	Flour Mill Margins	25
4.2	Amount of Grain and Flour Shipped by Truck 1980 and 1981	26
5.1	Planned Expansion of Port and Inland Storage Facilities	31
6.1	Utilization of Existing Port Storage and Handling Capacity	33
6.2	Projected Cereal Imports and Port Handling Capacity	34
6.3	Distance and Charges from Three Major Ports to Destination--Rail and Truck	37
6.4	Estimated Port Elevator Investment Costs	39
6.5	Estimated Port Grain Handling Costs (300 mt/hr; 20,000 mt)	40

Page No.

6.6 Estimated Port Grain Handling Costs (1,000 mt/hr; 60,000 mt)..... 41

6.7 Investment Costs for Inland Bulk Grain Handling and Storage Facilities..... 42

6.8 Estimated Annual Grain Storage Costs (20,000 mt Inland Storage)..... 43

6.9 Estimated Annual Grain Storage Costs (20,000 mt Inland Storage)..... 44

6.10 Estimated Annual Grain Storage Costs (6,000 mt Flour Mill Storage)..... 45

Foreword and Acknowledgements

This report summarizes the findings and recommendations of a six-person study team sponsored by the Trade and Development Program, International Development Cooperation Agency and the Foreign Agricultural Service, U.S. Department of Agriculture. Members of the team included Dr. James Ross (USDA/FAS), Mr. Lloyd Harbert (USDA/FAS), Mr. James Caron (USDA/Office of Transportation), Dr. Terrance Vorachek (U.S. Feedgrains Council), Mr. Joe Givens (Consultant/American Soybean Association) and Dr. Harry Pfost (Consultant/U.S. Wheat Associates). Field work was conducted in Morocco from October 17-30, 1982.

The primary purpose of the study was to develop an overview of Morocco's grain storage handling and distribution system, identify potential areas for investment and to prioritize these investments to facilitate financing by external donors such as the World Bank, the Islamic Development Bank and USAID. In addition, the team also examined the potential for joint ventures in feed milling and oilseed processing. Separate trip reports have been prepared on the Moroccan oilseed and feed industries.

The field work was financed by IDCA/Trade and Development Program as part of an overall effort to promote projects which lead to an expansion of U.S./Morrocan trade. The team acknowledges with appreciation IDCA's support and that of the U.S. Embassy in Rabat, and specifically that of the Agricultural Counselor, Mr. Forrest Geerken. The team is especially grateful to the various individuals representing the Government of Morocco and the private sector for taking time to meet with the team and to explain their roles in Morocco's grain distribution system.

All comments, opinions and recommendations expressed in this report are of course those of the team members and not necessarily those of the sponsoring institutions. Nevertheless, it is hoped this report will facilitate expansion of Morocco's cereal storage and handling capacity and, ultimately, achievement of the country's goal of food security.

Abbreviations, Acronyms and Rate of Exchange

Dh.	--	Dirham (Moroccan currency)
Km	--	kilometers
mt	--	metric tons
mmt	--	million metric tons
T/hr	--	tons per hour
OINCL	--	National Cereals Office (Office National Interprofessionel des Cereals et des Legumineuses)
ONCF	--	National Railroad Office
ONT	--	National Transport Office

Dh. 1.00	=	U.S. $0.16
U.S. $1.00	=	Dh. 6.25

MOROCCO
PORT AND INLAND CEREALS STORAGE
PREFEASIBILITY STUDY

Summary and Recommendations

The Ministry of Agriculture has prepared two plans to expand grain storage and handling capacity at the port and inland areas. The initial plan was based on storage requirements by 1990 and envisioned increases of 230,000 metric tons and 1,928,000 metric tons at the port and inland, respectively. Total investment costs were estimated to be Dh 2,892 million ($452 million). The second plan was structured along similiar assumptions but was based on storage requirements between 1981-85. It calls for construction of port storage at Tangier (100,000 mt), Nador (30,000 mt), Agadir (30,000 mt) and Laayoune (50,000 mt), plus an additional 900,000 mt inland. Total costs are estimated by the Government of Morocco to be Dh. 1516 million ($253 million).

Need for Improvement and Expansion of Existing System. There is a clear need for additional port storage and handling capacity and for a concurrent improvement in handling (and possibly storage) capacity inland. Although existing port storage and handling capacity is sufficient to handle cereal imports during a normal production year, it is inadequate to handle import requirements during years of drought. This is the case for both reasons of design and location of the current facilities. Facilities at Casablanca, the major port in terms of receiving imported cereals (over 70%), are primarily designed for export. While facilities are strategically located for meeting the needs of the major deficit regions, Casablanca and Rabat-Sale, storage capacity is unduly strained when domestic production short-falls necessitate import levels above 1.8 million metric tons. Although the facilities at Safi and Kenitra can be utilized, the cost of inland transport from Safi to Casablanca and Kenitra's limited draft capacity decrease the desirability of these two facilities; thereby, hampering efforts to counter-balance domestic production shortfalls through imports.

The need for expansion of port storage and handling capacity will become particularly acute by 1990 in light of forecast production and consumption of grains, particularly in the case of soft wheat, 2.8 mmt and maize .45 mmt. Nevertheless, currently planned expansion far exceeds these needs. Thus, priorities need to be set in selecting port sites and capacities.

Economic Feasibility of Proposed Expansion at the Ports. In the near term, construction of a grain storage and handling facility at Nador (20,000-30,000 mt) is the most economically viable investment ($12.3 million). It is estimated that this initial

investment would be paid back in seven years, given potential savings in inland transportation charges on grain currently being transshipped from Casablanca to Qujda.

Agadir is also a potential candidate for a 20,000 mt storage facility to meet local requirements (137,000 mt in 1981). If the 1981 cereals had arrived at the closest port to Agadir, Safi (370 km), the additional transport cost would have been at least $12.3 million. The question then is not so much of inland transport savings but one of recovering handling costs with the introduction of a new facility. Initially it is expected that this facility would be under utilized until more flour milling capacity can be established in the surrounding provinces.

Tangier should also be considered for a facility but on a smaller scale than currently planned. Construction of a 100,000 mt storage facility at Tangier would under utilize capacity. A more viable investment would be a 20,000 to 60,000 mt facility depending on the extent to which Tangier would supply internal needs in Meknes and Fes. This would reduce grain traffic through Casablanca by roughly 400,000 mt.

A possible alternative to building immediately at Tangier would be to forego construction until a facility can be built at Jorf Lasfar. Although inland transportation charges may be slightly higher from this port site to the major deficit regions, this factor could be exceeded by savings in ocean transportation charges. It is estimated that $16/mt could be saved on each ton shipped through Jorf Lasfar given its ability to handle 60-65,000 mt vessels. This is an area for further study.

Economic Feasibility of Proposed Expansion Inland. This study was not able to determine the relative merits of expanding inland storage given the lack of data on inter-province shipments of grain and the limited amount of time to analyze the data included in this report. Nevertheless, the following observations can be made.

> The present pricing system does not appear to reflect the real costs of storing grain over time. Farmers tend to sell their entire surplus to the government as quickly as possible and flour mills buy as late as possible. The result is the cost of storage is transferred to ONICL.
>
> It is more economic to store grain at the flour mills given reductions in suprevisory management costs and the ability to move toward bulk handling.
>
> There is some indication that flour mills are not fully utilizing their existing capacity, in part because they prefer to allow their covered bagged storage to remain empty and thereby rely on the cooperatives and ultimately ONICL to bear the costs of storage.

Storage at the flour mills could be encouraged by increasing the amount of bulk storage at existing flour mills, and by penalizing flour mills that order wheat at intervals shorter than one month.

On-farm storage could also be encouraged by raising the price of grain received at the mill by roughly one and a half percent per month.

Potential for U.S. Equipment Sales. Ship unloading equipment of the type which would be desired in the port elevator at Nador is not normally manufactured in the United States. The conveying, weighing and loading equipment would be available from U.S. suppliers. The cost of these items, FOB manufacturer, are estimated to be $2.6 million (300 metric ton per hour unloading rate). Inland storage facilities, if constructed using steel tanks, could also be supplied by the U.S. The cost of a 6,000 metric ton facility is currently estimated to be $600,000, plus transportation cost.

Areas for Further Study. In addition to project appraisal of a port storage facility at Nador, there are two other major areas that deserve attention. One area concerns the relative merits of the remaining proposals to expand Morocco's import capacity. This study should include: (1) a comparison of the relative costs and benefits of improving the facilities at Casablanca versus Safi as a means of increasing cereal import capacity; (2) the cost of constructing a new facility at Jorf Lasfar relative to that of improving the existing port facilities at either Casablanca or Safi; and (3) the trade-off between building a temporary facility at Agadir versus delaying construction until after expansion of the port; thereby, facilitating the construction of a more permanent facility.

The second area that should be studied is the costs and constraints associated with improving Morocco's ability to handle bulk grains internally, particularly at the flour mills. This study should also evaluate current utilization of existing flour milling capacity and review plans for expansion.

I. INTRODUCTION

Nature of the Study

The purpose of this study is to put Morocco's grain storage and handling requirements into perspective. It begins with a description of the grain supply/demand balance and an overview of the existing physical system for storage, handling and transport of grain within Morocco. Next, the institutional structure for purchasing and distributing both imported and domestically produced grain is outlined, distinguishing between public and private actors and the scope of their decisionmaking authority. Specific details on the extent to which producer and consumer prices are subsidized and the way in which these subsidies are institutionalized are also addressed.

With this perspective in mind, the final sections summarize Morocco's current plans for expanding its storage system both at the port and inland. The extent to which existing port and inland facilities are utilized is reviewed in order to identify the constraints to effective utilization of these facilities and as a means of justifying planned expansion. Thereupon the relative merits of the planned expansion at the ports and inland are evaluated.

Overview of Agriculture

Agriculture accounts for roughly 20-25 percent of GNP in Morocco and employs up to 60 percent of the population. Overall the sector has shown very little growth over the last decade in part due to the lack of public investment. The value of agricultural exports has tended to be less than the value of agricultural imports reflecting a pattern similar to that of the overall merchandise trade account ($2.4 billion deficit in 1981). Citrus, canned fish, canned vegetables and fresh tomatoes are the major agricultural exports. Wheat, sugar, edible oils and dairy products are the major agricultural imports.

Out of a total cultivable land area of 8,047 hectares roughly 60 percent is planted each year with the rest remaining in fallow. Cereals account for approximately 85 percent of the planted area followed by pulses, sugar (beet & cane), cotton and oilseeds. Because the bulk of this cereal production is in dryland areas, production is highly dependent on rainfall.

Following the 1981 drought there has been a growing recognition of the need to increase agricultural output and to seek ways to stabilize domestic availability of cereals for both human and animal consumption. It is estimated that as a result of the drought cereal production dropped by over 50 percent. Starvation and forced slaughter is believed to have reduced cattle numbers by 10-15 percent and sheep by 30-35 percent. The overall decline in the country's animal population has been estimated at about 20 percent.

According to the new Five Year Economic Plan (1981-85), production of cereals is targetted to increase by 3.1% annually. Similar targets have been set for oilseeds and olives (5.6%), truck farming (5.4%), industrial scale agricultural production such as sugar and citrus (7.2%), fruit (4.8%), and livestock (4.7%). These increases are to be brought about through a global investment in agriculture equal to Dh. 10.54 (US $2.34 billion) over five years. The bulk of this investment is directed toward irrigation projects (Dh. 4,220 million or 40% of the total), dryland farming (Dh. 1,868.2 million or 18%), and livestock projects (Dh. 1,156 million).

II. CEREAL SUPPLY AND DEMAND

Cereal availability in Morocco has shown only a marginal increase over the last decade. Imports have increased rather markedly, the bulk of the increase being attributed to the importation of soft wheat. As can be seen in Table 2.1 domestic availability of cereals has been subject to rather dramatic fluctuations due to variations in annual rainfall. These fluctuations in production have to an extent been counterbalanced by imports. Nevertheless these imports have not occurred at the proper time or in sufficient quantities to stabilize domestic availability. Whether or not these changes in domestic availability has resulted in dramatic shifts in actual consumption can not be measured at this time given the lack of a reliable time series on domestic cereal stocks.

Domestic Cereal Production

Barley accounts for the major proportion of Morocco's domestic cereal production followed by durum, maize and soft wheat. Approximately half of all barley production is directed toward animal consumption. In contrast most of the domestically produced durum and nearly all of Morocco's domestically produced soft wheat is directed for human consumption in rural areas. Since 1971/72 production of all major cereals has stagnated or declined marginally (Table 2.2). This has been the case despite the Government of Morocco establishing support prices which are significantly above international prices. Efforts are currently underway to increase yields of cereals grown on dryland areas and, as previously mentioned, cereal production is targeted to increase by 3.1% per year.

Demand for Cereals

Generally speaking, domestically produced durum (1.4 mmt.) and imported soft wheat (1.9 mmt.) account for the major portion of all cereals going directly for human consumption (Table 3.3). Roughly half of all domestically produced barley (1.0 mmt.) is also consumed directly. Of the three major cereals, consumption of soft wheat has experienced the most growth over the last decade, and continues to be the major area for continued growth in the near future. Given the rather high per capita consumption of wheat in urban areas, the major sources of continued growth will be due to population growth, rural to urban migration or substitution of soft wheat for barley and durum.

Table 2.1

Morocco: Total Cereal Production and Imports
1971/72 to 1982-83

Year	Production* (1,000 mt)	Imports** (1,000 mt)	Total (1,000 mt)
1971-72	4.76	.59	5.35
1972-73	4.63	.53	5.16
1973-74	2.82	1.04	3.86
1974-75	4.24	1.16	5.36
1975-76	3.16	1.23	4.39
1976-77	5.0	1.0	6.00
1977-78	2.63	1.86	4.49
1978-79	4.20	1.51	5.71
1979-80	3.69	1.64	5.33
1980-81	4.02	2.17	6.19
1981-82	1.46	2.71	4.17
1982-83a/	4.90b/	2.24	7.14

a/Forecast

b/USDA Ag Attache estimates 4.2 mmt

Sources: *MARA, Statisque Agricoles.
**ONICL.
USDA/FAS, Quarterly Grain and Feed Report, Sept. 10, 1982

Table 2.2

Morocco: Durum, Soft Wheat and Barley Production and Imports 1971/72 to 1982/83 (1,000 mt.)

Year	Durum		Soft Wheat		Barley	
	Production	Imports	Production	Imports	Production	Imports
1971-72	1.64	.003	.550	.574	2.57	.006
1972-73	1.63	--	.530	.469	2.47	.045
1973-74	1.18	--	.390	.983	1.25	.020
1974-75	1.38	--	.470	1.033	2.39	.089
1975-76	1.20	.048	.370	1.165	1.59	.014
1976-77	1.60	.075	.540	.924	2.86	--
1977-78	1.03	.040	.250	1.697	1.35	.043
1978-79	1.44	--	.430	1.414	2.33	.011
1979-80	1.31	--	.490	1.543	1.89	.124
1980-81	1.33	.080	.480	1.821	2.21	.078
1981-82	NA	NA	.169	2.058	1.04	NA
1982-83	NA	NA	.777	2.000	1.90	NA

Table 2.3

Distribution of Cereal Consumption, 1980

Supply/Demand	Hard Wheat	Soft Wheat	Barley	Maize	Other	Total
1. Production	1.384	.441	2.064	.343	.142	4.374*
2. Imports	--	1.540	.010	.090	--	1.640
3. Total	1.384	1.981	2.074	.433	.142	6.014
Demand						
1. Human Consumption	1.172	1.900	1.083	.136	.061	4.352
a. urban	.106	1.138	.108	.014	.006	1.372
industrial	.084	1.134	--	--	--	1.218
other	.022	.004	.108	.014	.006	.154
b. rural	1.066	.762	.975	.122	.055	2.980
industrial	.042	.568	--	--	--	.610
other	1.024	.194	.975	.122	.055	2.370
2. Animal Consumption	--	--	.723	.269	.062	1.024
3. Seed (6.5%)	.143	.059	.165	.011	.012	.390
4. Waste (3.6%)	.069	.022	.103	.017	.007	.218
5. Total	1.384	1.981	2.074	.433	.142	6.014

*The estimate of total production is higher than that shown in Table 2.1.

Another major area where cereal consumption can be expected to increase is indirectly through animal consumption. This is particularly true in the case of imported maize which is directed toward the poultry industry. A recent study estimated that with proper promotion and marketing techniques, poultry consumption could expand by as much as 25% per year. In that roughly 80% of all imported maize (165,000 mt.) is fed to poultry, maize consumption and possibly imports could increase by as much as 40,000 mt. per year.

Cereal Imports

Soft wheat which is directed toward the commercial flour milling industry accounts for the bulk of Morocco's cereal imports. As can be seen in Table 2.4 since 1980/81 approximately 1.8 mmt of soft wheat has been imported each year, either from the United States or France. Those originating from the United States have traditionally been supplied on a cash basis (less than 360-day repayment), under a three year commercial credit guarantee (GSM-102) or under P.L.480 Title I food aid. French imports have generally been financed under a two year (1981-83) C.O.F.A.S. agreement.

ONICL, which is responsible for directing the scheduling and arrival of wheat imports has attempted to schedule these imports such that they arrive evenly throughout the year thereby easing pressure on the port of Casablanca and assuring an even supply of wheat to the commercial flour mills. Historically, arrivals during October/December have been lower on average than the other three quarters of the year, in part reflecting the need to utilize inland storage for domestically produced cereals.

Table 2.4

Wheat Imports by Source of Supply
(July/June)

Supplier	1979/80 (1,000 mt)	1980/81 (1,000 mt)	1981/82 (1,000 mt)	1982/83 (1,000 mt)
A. France	757,249	1,364,781	1,104,183	100,000
B. United States	435,353	598,000	1,093,000	1,700,000
(1) Commercial				
Cash	377,943	561,115	124,925	---
Credit * Guarantee	---	---	646,000	1,500,000**
(2) P.L. 480 ***				
Title I	57,410	36,885	322,075	200,000
C. Other	292,904	80,881	30,817	100,000
TOTAL	1,485,506	1,864,262	2,228,000	1,800,000
TOTAL CEREALS	1,640,000	2,170,000	2,705,000	2,240,000

* Morocco imported $96.0 million of wheat under GSM-102 commercial credit guarantee program during 1981/82. These credits were for three years at interest rates slightly above LIBOR.

** As of December 1982, 20,000 mt of wheat had been exported to Morocco under the GSM-102 ($112 million) and the new blended credit program ($28 million).

***The value of P.L. 480 Title I shipments to Morocco were $9.6 million, $6.4 million and $45 million for 1979/80, 1980/81 and 1981/82 respectively. Morocco is expected to allocated $25 million during FY 83 (Oct/Sept) under P.L. 480 Title I.

Source: USDA/FAS

III. STORAGE, MARKETING AND DISTRIBUTION

This section describes Morocco's existing physical system for grain handling and storage at the ports and inland. It begins with a description of the seven major commercial ports which currently receive imported grain or are likely to receive grain sometime in the future according to existing plans. This description includes a statement on the size of ship that can be received, type of unloading and storage facilities currently in place and plans for expansion. Next handling and storage capacity inland is identified according to type of facility, ie. silo, covered storage (magasin) or open air (plinth aand tarpaulin), location and ownership. Finally, the location of this storage is contrasted with derived cereal transport patterns based on province level cereal production and consumption statistics.

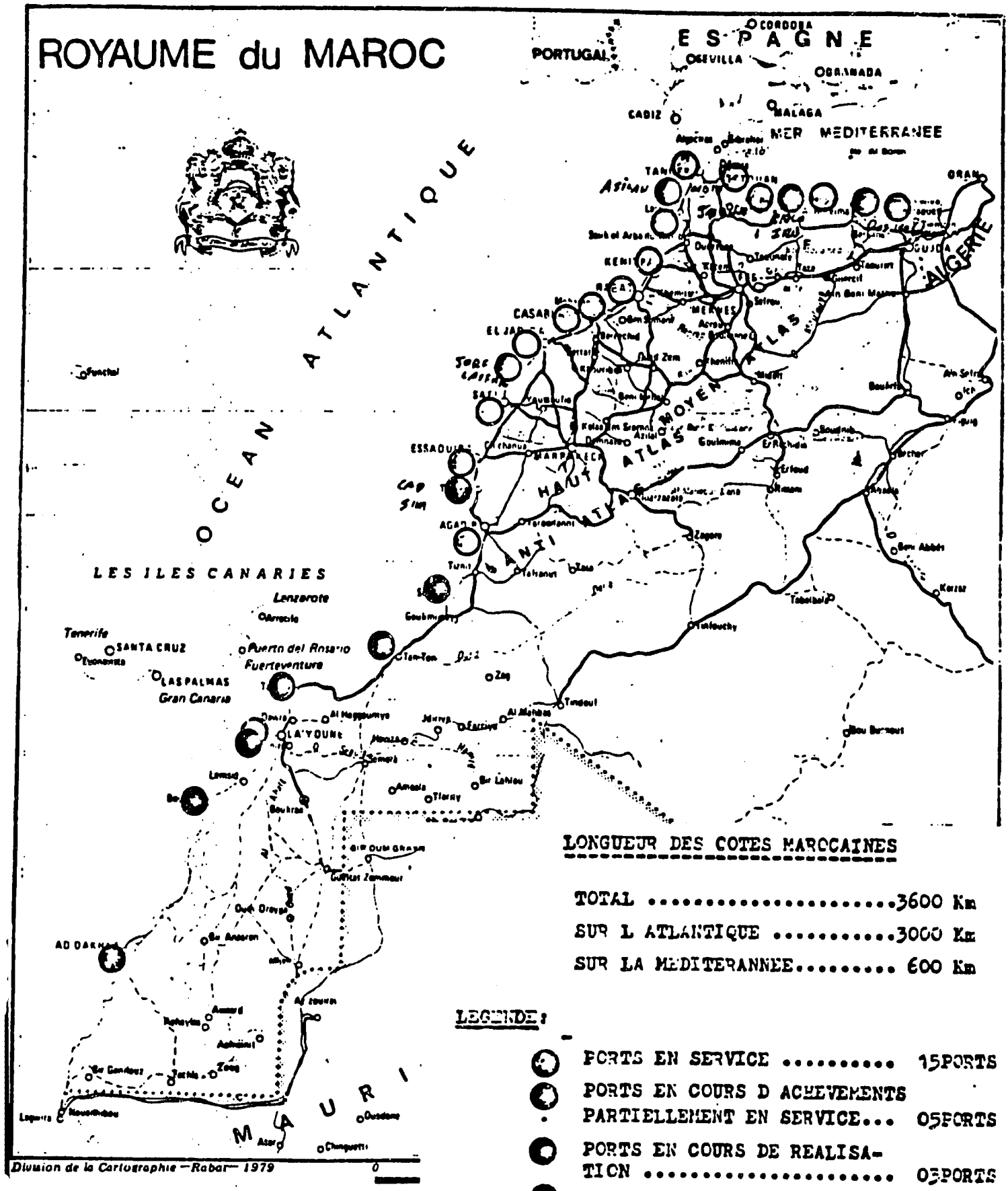
Port Storage Facilities

Morocco is endowed with excellent access to ocean transport with a total coastline of 3600 kilometers (Km), 3000 Km of Atlantic coast and 600 Km of Mediterranean. Access is gained through 26 ports, 6 of which are expanding or are new constructions. Table 3.1 identifies the seven major commercial ports and the commodities handled (imported and exported) in 1981. Casablanca, the center of Moroccan commerce, is the busiest port handling over 60% of all ocean traffic. Ranked by total volume, Safi, Mohammedia and Agadir distantly follow with even smaller tonnages being handled through Tangiers, Kenitra and Nador. Discounting Mohammedia, which handled no cereals in 1981, and Tangiers, where cereal imports were 38.5 percent of total volume, grain ranged from 6.0 to 15.0 percent of total port commercial activity.

At least four factors are considered by the Moroccan cereals office when selecting a port to receive cereals: (1) depth of the water at the port, (2) type of grain handling and storage facilities at the port site, (3) degree of port conjestion, and (4) availability of rail and truck service. One of the most prominent factors is depth of water at the port and specifically at the quay or wharf at which the grain will be discharged. Depth at quay and the related maximum vessel size are important port selection determinants because of the rate structure adopted by ocean vessel merchants. Generally, as the vessel capacity increases the costs per unit to ship a particular commodity (usually bulk) will decrease. Economies of scale are realized in varying degrees for almost the entire range of capital and labor inputs for both construction and operating costs. As long as rates are allowed to reflect the lower costs of operating the larger vessels at capacity, a larger ship, hence a deeper port, is preferable for the shipment of grain.

Depth at quay, along with meters of quay length (not found to be a constraining factor), allow for a projection on the size of vessel that may be berthed for cereals discharge. Size of vessel is generally reported either in terms of gross tonnage or deadweight tonnage. Gross tonnage refers to the cubic capacity tonnage (1 ton equaling 40 cubic feet) while deadweight tonnage refers to weight capacity. Because grains are less dense than most commodities shipped by sea, the constraining factor would be cubic capacity rather than weight. For this reason, the depth/tonnage relationship portrayed in Figure 1, is based on gross tonnages. The maximum depth at quay appears for each port in Table 3.2.

ROYAUME du MAROC



LONGUEUR DES COTES MAROCAINES

TOTAL .....3600 Km

SUR L ATLANTIQUE .....3000 Km

SUR LA MEDITERANNEE..... 600 Km

LEGENDE:

- PORTS EN SERVICE 15PORTS
- PORTS EN COURS D ACHEVEMENTS PARTIELLEMENT EN SERVICE... 05PORTS
- PORTS EN COURS DE REALISATION 03PORTS
- PORTS EN PROJET 03PORTS

Table 3.1

Port Activities - 1981 (1,000 metric tons)

Product	Total	Port						
		Casablanca	Mohammedia	Safi	Agadir	Kenitra	Tangier	Nador
Phosphates	15,646	12,912	-	2,727	-	-	-	-
Primeurs	704	458	-	-	115	-	50	80
Petroleum	5,304	1,089	3,774	5	278	44	105	-
Cereals	2,444	1,604	-	355	137	80	216	50
Minerals	1,093	205	-	510	117	122	-	138
Other Merchandise	6,483	3,121	106	2,181	332	264	190	150
Fish	303	-	-	48	185	1	-	16
fresh	73	-	-	4	24	1	-	16
industrial	230	-	-	44	161	-	-	-
Total	32,280	19,389	3,880	5,874	1,349	512	561	450

Source: Government of Morocco, Director of Ports

Table 3.2

Port Equipment, Infrastructures, and Superstructures Relating to the Storage and Handling of Bulk Cereal Products

CAPABILITIES1/	CASABLANCA	TANGIERS	NADOR	AGADIR	SAFI	KENITRA	JORF LASFAR2/	MOHAMMEDIA2/
Infrastructure								
Maximum Depth at Quay (M)	-9.1	-9.0	-7.0	-8.8	-8.5	-3.5	-15.0	-7.6
Ship Tonnage (000)	20-25.0	20-25.0	15.0	13-18.0	15-18.0	5-8.0	60-65.0	15.0
Superstructure								
Facility Type3/	Silo (2)	Covered Flat	None	None	Silo	Silo	None	None
Total Facility Capacity (T) (000)	70.0	16.0	---	---	24.0	12.0	---	---
Handling Equipment	Mechanical, Pneumatic, Crane	Pneumatic Crane (3)	Crane (3)	Mech. Shovels (3)	Pneumatic	Mechanical	Crane (3)	None
Unload Capacity (T/Hr)	220	40	40	20	160	120	N/A	N/A
Rail Service	Yes	Yes	No	No	Yes	Yes	No	Yes
All Cereals Received 1981 (000)	1,604.0	216.0	50.0	137.0	355.0	80.0	None	None
Projected Expansion4/	600 Ton/Hr Handling Capacity	100,000 Ton Silo Dredge to 14 M	40-50,000 Dredge to 10 M Rail Mid-1983	Tempor-ary Silo --20,000 Tons	400 Ton/Hr unload		50,000 Ton Silo Rail-1984	100,000 Ton Silo Proj. 1. M Depth

1/ All port specifications refer to imported cereal handling and storage capabilities; T = Metric Tons, M = Meters, Hr = Hours.
2/ The ports of Jorf Lasfar and Mohammedia are deepwater ports currently under construction.
3/ Facilities listed are those commonly used for grain storage. In ports having no grain facilities, grain is unloaded onto quays and removed as soon as practicable.
4/ Projections collected from independent sources, i.e., ONICL, SOSIPO, port directors.

Another determinant in selecting ports for grain reception are the facilities available to transfer and store the commodity. A vertical silo for storage with pneumatic or mechanical (conveyor) unloading is preferred. While ton-per-hour capacity of the unloading mechanism is important, the necessary rail and truck loading rate must be comparable if maximum throughput is to be achieved. In the absence or lack of capacity of port silo/automatic handling facilities, cranes or mechanical shovels may be employed. The process is much slower than the former method and there is a limit to the number of cranes that may be employed at one time either unloading or loading. Extra cost is incurred if the grain must be transferred by truck to horizontal storage facilities at the port than trans loaded to trucks for local delivery.

Rail service to shipside will affect both loading capacity (and therefore throughput capacity) and the utlimate distribution costs of cereals. In bulk, rail hopper cars (6.52 M length, 3.17 M width) may carry up to 50 tons, while trucks will load only 25 tons. The increased loading capacity partially accounts for a shipping rate of 0.139 DH/mt for rail as opposed to 0.2431 DH/mt for truck (Ministry of Transport, 1981 rates).

In addition to port depth, storage and handling facilities, grain port selection determination for individual loads or for long term investment must consider the degree of congestion on both water and land. Both modes of transport may incur higher costs either through demurrage costs or time-in-transit. Total volume may be higher than the ports capacity to adequately and efficiently handle ship, rail, and motor carrier traffic associated with all commodities passing through a port.

Most ports under study had some plan for expansion in the near future, sometimes independent of anticipated grain traffic (e.g., increasing port depth). An assessment of port selection determinants follows and includes those future plans.

Casablanca's port grain facilities handled a record 1.54 million metric tons of wheat in the 1980-81 import season, a remarkable accomplishment considering the age and structure of its North silo installation. The North silo, with a storage capacity of 40,000 tons was built in 1933 to handle grain exports. Due to the present and projected imports of 1954, the silos handling facilities were converted to accommodate grain ship unloading and land vehicle loading. Another silo of 40,000 tons was added in 1972. Casablanca currently handles 60-70 percent of Moroccan cereal imports.

Another constraint on imported grain handling is the size of ship which may dock at the silo location. At present, the depth at the unloading quay is 9.1 meters which allows for a 20-25,000 ton vessel depending on the ship's design. Ships arriving for unload carry 20,000 to 21,000 tons on the average although 5,000 ton loads are not uncommon. In instances where ship's draft exceeds depth, grain may be discharged by crane or quay having greater (to 10.36 meters) adjacent depths. In emergency situations, when many grain ships are waiting to unload and grain is needed immediately inland, up to 4 ships may unload at one time, 3 unloading directly on the quay.

Grain is loaded directly into rail cars and trucks through overhead chutes, a part of the silo's mechanical grain handling system. On a 24-hour basis, 6,600 tons or more may be outloaded for delivery (using supplemental cranes), the constraint more often being the receivers' (mills and inland storage areas) unloading capability. Automatic grain handling capacity is 220 tons per hour. Rail carriage accounts for about 65 percent of the traffic from Casablanca and truck 35 percent. Casablanca receives about 15 percent of its total grain in bags (85 percent bulk) which is generally loaded onto trucks rather than rail cars. No bagging is done at the port location.
Because Casablanca handles a great deal of other caroges other than grain, ship congestion is often a limiting factor. This, coupled with Casablanca's congested road and rail infrastructure, limits future expansion of the port's grain storage facilities. However, a proposal to increase the present grain handling facility to 600 tons/hour is being considered.

Tangiers' grain handling ability is limited more by its lack of storage, grain handling equipment, and rail facilities than by its ability to handle larger ships. With a depth of 9 meters at quay, 20-25,000 ton ships may berth next to the quay onto which grain is unloaded. Average imported load is about 10,000 tons which may be discharged at a rate of 800 tons per day. Cranes discharge the majority of the grain and pneumatic vacuums discharge the remainder from the ship's hold. Tangiers received 216,000 tons of cereals in 1981.
Grain is transferred either to horizontal port storage facilities (16,000 ton capacity) or transferred to local flour mills in bags. Bagging is accomplished at port by hand. There are no bulk loading facilities for rail and truck. A rail line exists adjacent to the cereals receiving area and although no grain was reported shipped by rail in 1981 over 21,000 tons have been shipped in 1982. Use of truck or rail is determined more by distance shipped than by transport availability.
Tangiers is currently scheduled to be dredged to a depth of 14 meters. This would allow for the receipt of ships beteen 55 to 60,000 tons depending on the depth dredged at the cereals quay. A silo of 100,000 ton storage capacity is also projected.

Nador is currently being expanded and promises to compete with Tangiers as a major commercial port on the Mediterranean Coast. Current draft is 7 meters at the cereals quay but future dredging plans should increase this depth to 10 meters. At present, 15,000 ton ships may be berthed for unloading with increases to 25,000 tons at 10 meter depths. Nador presently has no storage facilities and grain is placed on the quay for loading onto trucks as they become available. Although every attempt is made to limit losses, grain must often be left uncovered during periods of high winds and rain because of lack of transport. Rates of 10% grain loss were reported for periods of extreme adverse weather. Over 50,000 tons of grain were received in Nador in 1981.

In addition to the planned dreding, a rail line is presently being built which will connect the harbor area to the main line between Fes and Oujda in mid-1983. Projected also is a silo of 40,000 to 50,000 ton storage capacity with automatic grain handling.

Agadir is the southern most receiving port for cereals. In 1981, over 137,000 tons of grain were received for distribution in the southern provinces. Draft at quay is currently 8.8 meters which allows for the accommodation of between 15,000 to 18,000 ton vessels. Three mechanical shovels are employed to discharge grain onto the quay for transport by truck to local mills and storage areas. Agadir has no storage facilities for grain at the port. The lack of rail facilities at Agadir (closest main lines are at Safi and Menakes) inhibits Agadir's use as a major import facility for the northern provinces but necessitates its use as a receiving point for cereals destined for the southern provinces.

Safi is the second largest cereal importing location in Morocco. In 1981 import tonnages exceeded 355,000 tons despite a maximum quay depth of 8.8 meters which restricts ship tonnages to 15,000 to 18,000 ton vessels. Safi's importing capabilities are enhanced by a 24,000 ton vertical storage facility with a pneumatic grain handling system. Ship unloading capacity is rated at 160 tons per hour and both truck and rail equipment may be loaded. Safi is currently scheduled to upgrade its current handling capacity to 400 tons per hour.

Kenitra is the shallowest grain receiving port with a depth of 3.5 meters. Vessels with maximum capacities of 5-8,000 tons discharged 80,000 tons of cereals in 1981. A silo with mechanical unloading capabilities may store up to 12,000 tons and load either truck or rail equipment. Currently, there is no plan to expand port or grain unloading/storage facilities.

Jorf Lasfar is the newest deepwater port (15.0 meter depth) with the potential to handle 60-65,000 ton grain vessels. Although still under construction, Jorf Lasfar begain handling small amounts of grain in 1982. Grain is transferred from ship to quay by crane and must be trucked immediately to inland storage facilities as none exists at the port. At present no rail facilities exist but a line from the harbor to the mainline is scheduled to be completed in 1984. Tentative plans call for a silo of 50,000 ton capacity.

Mohammedia is currently expanding its capabilities as a petroleum recieving port increasing depth from 7.6 meters to 15 meters. This should allow for increased ship tonnages from the current 15,000 tons to 60-65,000 tons. Currently, Mohammedia receives no grain but projects a 100,000 ton silo at some point in the future.

Inland Storage Capacity

According to data currently available (Table 3.4) Morocco has over 8.0 mmt of inland storage capacity, the bulk of which (6.5 mmt) lies outside of the commercial sector. The quality of this "traditional" (on-farm) storage capacity is unknown. Moreover the accuracy of the province level statistics are suspect. More is known about the roughly 1.7 mmt of storage which comprises the so-called "commercial" sector. Essentially this storage is comprised of those facilities owned and operated by the cooperatives (SCAM or CMA), by licensed traders or by the flour mills. The major portion of this storage is oriented toward handling bagged cereals to be stored in either flat covered storage (1.05 mmt) or on plinths covered with tarpaulins (.3 mmt). Less than 300,000 mt of the inland storage is designed for bulk handling (silo), of which 73,000 mt, 68,000 mt, and 147,000 mt are controlled by the flour mills, licensed traders and cooperatives, respectively (Table 3.3).

Table3.3

Inland Storage Capacity By Type and Organization*

Organization	Type of Facility			
	Covered (mt)	Silo (mt)	Open (mt)	Total (mt)
Flour Mills	152,247	73,482	23,000	248,729
Licensed Traders	653,063	67,912	163,447	884,422
SCAM/CMA	246,138	147,250	130,720	524,108
Total	1,051,448	288,644	317,167	1,657,259

*This excludes 106,000 mt. of silo storage at the port.

The average farm storage facility is very limited, usually an underground chamber or a small warehouse that can hold a maximum of 10 mt of wheat. The small dealers have no storage, usually own a truck and buy in small quantities at the weekly souks and sell to the legimate dealers, more commonly called "collectors". The collectors have very limited storage facilities, usually in small villages or near a souk. They collect the grains from different souks of the area, and they sell them to the licensed traders. Like farmers, most collectors have no official incentive to store. A few well-organized collectors do get a payment for storage.

Table 3.4

Province Level Cereal Consumption, Production and Storage Capacity 1981/82

	Est. 1981/82 Consumption	Est. 1981/82 Production (1,000 mt)	Storage Capacity 1981/82 Traditional (1,000 mt)	Storage Capacity 1981/82 Commercial (1,000 mt)	Storage Capacity 1981/82 Total (1,000 mt)
I. The South					
Agadir	286.7	147.6	336.4	47.5	383.9
Quarzazate	179.4	96.1	318.0	---	318.0
Titnit	103.0	27.1	83.0	---	83.0
Tata	32.4	1.5	48.2	---	48.2
	601.5	272.3	785.6	47.5	833.1
II. The Tensift					
Essaouria	141.3	149.5	226.3	38.6	264.9
El Kelaa	171.2	260.1	226.6	4.4	231.0
Marrakach	375.7	328.7	748.8	55.2	804.0
Safi	199.0	298.9	377.1	109.2	486.3
	887.2	1,037.2	1,578.8	207.4	1,786.2
III. The Centre					
Azilal	121.1	124.7	256.4	---	256.4
Ben Slimane	55.5	138.0	47.3	---	47.3
Ben-Mellal	176.9	240.3	216.2	69.7	285.9
Casablanca	734.1	59.1	46.7	436.9	483.6
El Jadida	214.9	196.4	216.3	63.7	280.0
Khouribga	131.2	152.1	244.4	---	244.4
Settat	212.4	254.5	356.4	15.9	372.3
	1,646.1	1,165.1	1,383.7	586.2	1,969.9
IV. The Northwest					
Chaouen	91.9	39.9	62.5	---	62.5
Kenitra-Gharb	367.4	626.4	320.0	396.6	716.6
Khemisset	131.2	346.7	568.0	29.1	597.1
Rabat-Sale	269.6	43.8	14.5	49.4	63.9
Tanger	116.9	32.3	19.7	13.3	33.0
Tetouan	210.0	103.2	65.3	21.7	87.0
	1,187.0	1,192.3	1,050.0	510.1	1,560.1

	Est. 1981/82 Consumption	Est. 1981/82 Production (1,000 mt)	Storage Capacity 1981/82 Traditional (1,000 mt)	Commercial (1,000 mt)	Total (1,000 mt)
V. The North-Central					
Al Hoceima	94.1	83.6	74.1	---	74.1
Boulemanc	39.1	12.5	25.5	---	25.5
Fes	229.0	149.3	74.3	178.5	252.8
Taounate	172.3	257.2	145.6	---	145.6
Taza	189.8	177.8	455.7	22.4	478.1
	724.3	680.4	775.2	200.9	976.1
VI. The East					
Figuig	33.1	5.4	13.2	---	13.2
Nador	187.7	49.8	136.6	11.9	148.5
Qujda	237.8	91.1	93.0	---	93.0
	458.6	146.3	242.8	11.9	254.7
VII. The South-Central					
Errachidia	124.1	16.8	571.4	---	571.4
Khenifra	91.6	151.6	141.9	3.6	145.5
Maknes-Ifrana	238.7	239.5	32.2	111.6	143.8
	454.4	407.9	745.5	115.2	860.7
VIII. Other[b/]	48.0	---	---	---	---
TOTAL	6,000.0	4,901.5	6,561.6	1,679.2	8,240.8

a/ The consumption estimate was derived by multiplying the province level population by 287 Kg of cereals per capita. Total population in 1980/81 is assumed to be 20.9 million.

b/ Includes Tan-Tan and Guelmin.

Table 3.5

Cereal Supply/Demand Balance by Province

	Est. Consumption	Production 1980/81	Production 1981/82	Supply/Demand Balance 1980/81	Supply/Demand Balance 1981/82
I. The South					
Agadir	286.7	4.0	147.6	(282.7)	(139.1)
Quarzazate	179.4	---	96.1	(179.4)	(83.3)
Tiznit	103 0	8.4	27.1	(94.6)	(75.9)
Tata	32.4	---	1.5	(32.4)	(30.9)
	601.5	12.4	272.3	(589.1)	(329.2)
II. The Tensift					
Essouria	141.3	57.1	149.5	(84.2)	8.2
El Kelaa	171.2	72.2	260.1	(99.0)	38.9
Marrakech	375.7	86.7	382.7	(289.0)	(47.0)
Safi	199.0	153.1	298.9	(45.9)	99.9
	887.2	369.1	1,037.2	(518.1)	150.0
III. The Centre					
Azilal	121.1	46.1	124.7	(75.0)	3.6
Ben Slimane	55.5	40.3	138.0	(15.2)	82.5
Ben-Mellal	176.9	25.8	240.3	(151.1)	63.4
Casablanca	734.1	28.6	59.1	(705.5)	(675.0)
El Jadida	214.9	19.9	196.4	(195.0)	(18.5)
Khouriiga	131.2	24.6	152.1	(106.6)	20.9
Settat	212.4	75.8	254.5	(136.6)	42.1
	1,646.1	261.1	1,165.1	(1,385.0)	(481.0)
IV. The Northwest					
Chaouen	91.9	18.4	39.9	(73.5)	(52.0)
Kenitra-Gharb	367.4	66.0	626.4	(301.4)	259.0
Khemisset	131.2	101.3	346.7	(29.9)	215.5
Rabat-Sale	269.6	17.3	43.8	(252.3)	(225.8)
Tanger	116.9	12.0	32.3	(104.9)	(84.6)
Tetouan	210.0	18.4	103.2	(191.6)	(106.8)
	1,187.0	233.4	1,192.3	(953.6)	5.3

Table 3.5 (Continued)

		Est. Consumption	Production 1980/81	Production 1981/82	Supply/Demand Balance 1980/81	Supply/Demand Balance 1981/82
V.	The North-Central					
	Al Hoceima	94.1	33.7	83.6	(60.4)	(10.5)
	Boulemane	39.1	9.2	12.5	(29.9)	(26.6)
	Fes	229.0	43.0	149.3	(186.0)	(79.7)
	Taounate	172.3	76.4	257.2	(95.9)	84.9
	Taza	189.8	96.0	177.8	(93.8)	(12.0)
		724.3	258.3	680.4	(466.0)	(43.9)
VI.	The East					
	Figuig	33.1	3.7	5.4	(29.4)	(27.7)
	Hador	187.7	42.9	49.8	(144.8)	(137.9)
	Qugda	237.8	120.3	91.1	(117.5)	(146.7)
		458.6	166.9	146.3	(291.7)	(312.3)
VII.	The South-Central					
	Krrachida	124.1	---	16.8	(124.1)	(107.3)
	Khenifra	91.6	65.4	151.6	(26.2)	60.0
	McKnes-Ifrane	238.7	95.8	239.5	(142.9)	.8
		454.4	161.2	407.9	(293.2)	(46.5)

Most licensed traders and millers have good storage facilities to store grains for a short period (2 to 4 weeks). The largest cereal storage facilities in Morocco are owned by the cereals cooperatives (CMA and SCAM) and some private traders. These two last categories play the largest role in this business. They own most ot the grain purchasing, storage, and handling facilities in Morocco. their terminal elevators and their large warehouses are located in the major cities where the milling industry is concentrated. They handle both domestic and imported grains. They generally are equipped to handle bulk as well as bagged grain by rail or trucks. The ONICL absorbs all the storage cost of the cooperatives, the millers, and the licensed traders, but does not directly own any physical facilities.

Location and Capacity of Flour Mills

Morocco currently has over 71 commercial flour mills in operation with a total estimated milling capacity of 1.86 million metric tons (Table 3.6), roughly equivalent to Morocco's annual imports of soft wheat. The bulk of this capcity is centered in Casablanca (16 mills - 577,674 mt) and Fes (15 mills - 220,941 mt). Although statistics are not readily available on the type of storage and handling facilities used at each of these mills, it appears that the extent to which each mill can handle bulk grain varies. The mill at El Jadida, for example, can handle and store both bagged and bulk grains. While the bulk storage (silo) is currently being utilized, the covered bagged storage is generally empty due to the millers decision to transship its monthly requirements directly from the port of Casablanca in bulk or from the local SCAM cooperative in bags by the truckload rather than store bags on the premises. In contrast, it was mentioned by officials at the port of Tangier that all local mills in the area could only handle grain in bags thus necessitating the bagging of grain by hand at the port prior to shipment to the mill.

Cereal Transport Patterns

While some information on inter-province level movement of cereals in the commercial sector is available for selected years, due to the relative size of the commercial sector in relation to the traditional sector, this information does not fully reflect the regional supply/demand balances for cereals. Table 3.5 infers regional movements by contrasting an estimate of province level consumption against production. It does so for both a good (1981/82) and a bad year (1980/81), and is based on per capita consumption of 287 kg./yr.. Out of the 31 provinces approximately 12 produce a marketable surplus of cereals during a "good year" which can be trans-shipped to deficit regions (928,000mt.) - the bulk of this surplus originating in two provinces Kenitra-Gharb (259,000 mt.) and Khemisset (215,500 mt.) in the Northwest region. During a "bad year" all provinces would be in deficit if per capita consumption levels were to be maintained.

Table 3.6

Capacity and Location of Moroccan Flour Mills

Province	Number	Capacity
1. Agadir	2	72,756
2. Casablanca	16	577,674
3. El Jadida	1	31,787
4. Essaoira	1	23,354
5. Fes	15	220,941
6. Kenitra	6	113,028
7. Marakech	5	112,324
8. Meknes	6	180,198
9. Nador	1	30,576
10. Qued Zem	1	13,391
11. Qujda	5	132,962
12. Rabat	2	102,555
13. Safi	1	42,342
14. Settat	1	42,342
15. Tanger	3	74,559
16. Taza	1	25,459
17. Tetouan	4	62,396
Total	71	1,858,644

IV. INSTITUTIONAL STRUCTURE

Both the public and private sector are directly involved to varying degrees in both the importation and domestic marketing of grain. The Office National Interprofessionel des Cereals et Legumineuses (ONICL) provides the overall coordination making the primary decisions on the amount, timing of shipment and delivery port for all imported grain. In addition it assures that support prices are adhered to and that internal movements of grain are consistent with keeping an even flow of commodities to the commercial flour and feed mills throughout the country. Under the overall guidance of ONICL there are a host of other actors responsible for storing and handling both domestically produced and imported grain, specifically the SCAM and CMA cooperatives and the licensed traders. In addition, the National Transportation Office is charged with monitoring truck traffic, while the National Railroad Office is in charge of rail traffic.

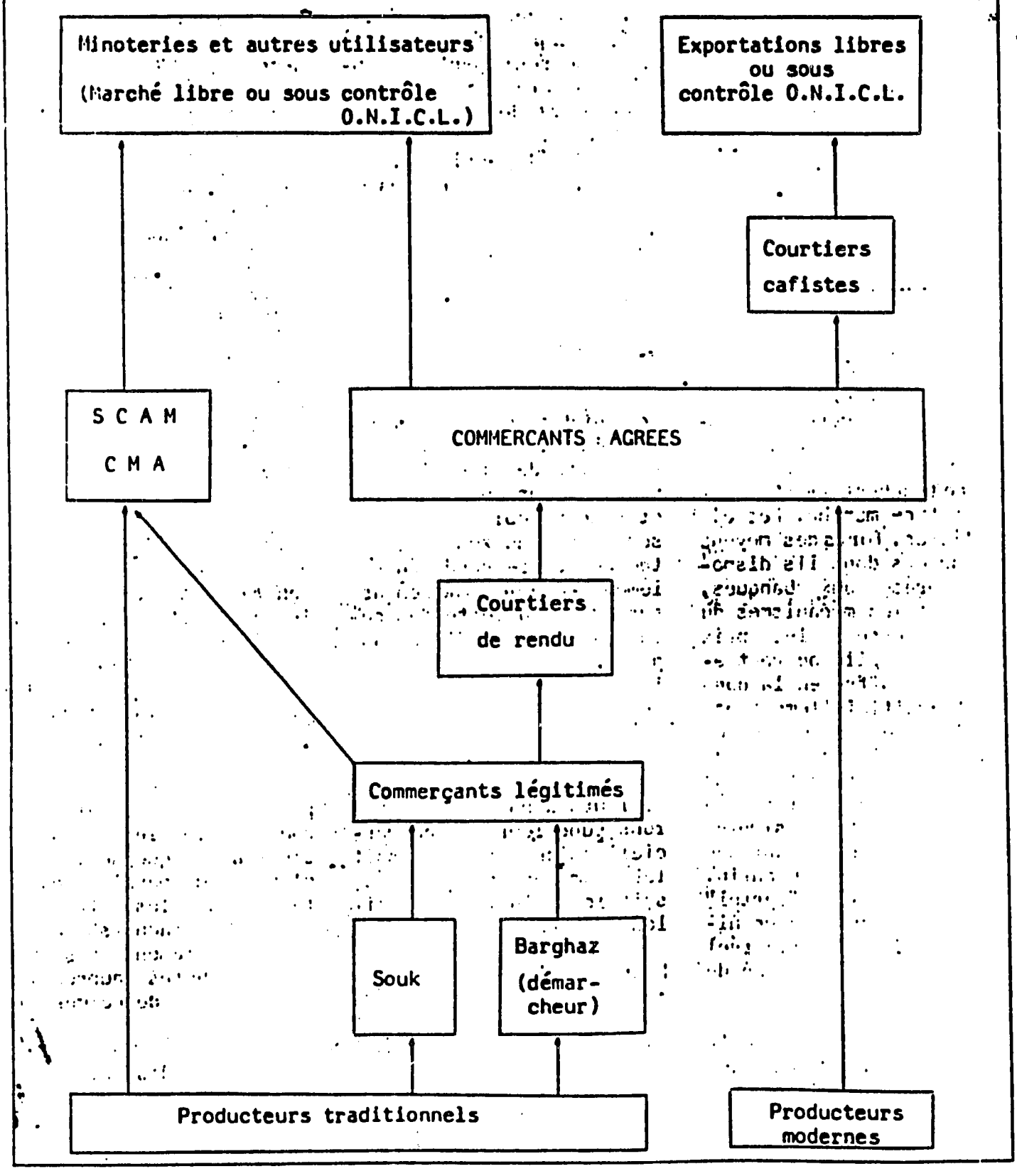
This section describes these various institutions. It begins with a description of ONICL and then moves on to a discussion of the producer and consumer subsidies on wheat and wheat flour. Finally, the activities of the National Transport Office (Office National des Transport) and the National Railroad Office are described as they relate to the internal movement of cereals, under the overall direction of ONICL.

Overall Coordination

ONICL, which is responsible for regulating Moroccan trade in cereals and legumes, was formally established 24 April 1937. It is guided by an interministerial council headed by the President of the Ministry of Agriculture and composed of the ministers from finance, commerce, industry, public works and interior, in addition to representatives from the Chambers of Agriculture (5), the Union of Cooperatives (1), the licensed traders (2), the flourmilling and baking industry (2), plus the Secretary General of the Ministry of Agriculture and the directors for customs, agricultural research and the National Agricultural Credit Bank. The representatives are designated by the Minister of Agriculture following proposals by the interested professional organizations. The other representatives are also designated in a similar manner. Decisions are made based on an absolute majority of the members present (no less than 11 members for a quorum). It can meet as often as necessary but no less than twice a year. The first meeting each year occurrs in the second trimester of the year before the beginning of the new crop year to review crop conditions, to decide on the budget and to establish support prices for the coming year. The second meeting occurrs at the middles of the fourth trimester to assess the outcome of the domestic crop.

ONICL has the responsibility to manage cereals distribution in each province and maintain prices equal to the GOM support price. It controls about 10 percent of the grain production that enters the commercial channel plus all imported cereals. It operates through licensed cereals traders, the industrial millers, the office of transport and in crisis time, the local authority is also involved.

SCHÉMA DU CIRCUIT DE COMMERCIALISATION DES CÉRÉALES



8

Cereals availability and distribution in each province is inspected daily by ONICL local representatives. In case of shortage instructions are given by the ONICL headquarters in Rabat to move cereals from surplus existing in an area or from imported wheat stocks to provinces where a shortage starts to appear. Through this movement prices are stabilized.

Price and Subsidization Mechanisms

The Government of Morocoo subsidizes both consumers and producers of soft wheat. It does this by maintaining a domestic support price for soft wheat at the farm level which is substantially above international prices (1400 DH/mt versus 869 Dh/mt); while at the same time it maintains a selling price for wheat flour (1120 Dh/mt) to consumers which doesn't adequately reflect the real costs associated with importing soft wheat (869 Dh/mt), transporting it to a local cooperative or flour mill, storing it for two months, and milling it into flour (398 Dh/mt). Consequently, the Government spends equivalent to 531 Dh for every ton of wheat purchased from its farmers and a consumer subsidy equivalent to 147 Dh on each metric ton sold to consumers.

Producer Subsidy

Locally produced soft (bread) wheat has a ceiling and floor, essentially a fixed price throughout the country, of 1400 Dhs/mt. Farmers who sell to SCAM, CMA or licensed private traders receive the base price for standard commercial grade having 3% impurities and a test weight of 77 Kg/Hl. However, the marketing agent deducts 8.50 Dhs/mt which represents a marketing tax. This represents a net return to the farmer of 1392.50 Dhs/mt. The farmer is furnished with bags by the agent and must transport to the point of sale. Grain is reported to be selling at about 1350 Dhs/Kg at various points throughout the country. Thus the stabilization program appears to be protecting the farmer. Wheat is sold to flour mills at 1400 Dhs/mt Durum wheat. The floor price for durum is also 1400 Dhs/Qx but there is no ceiling and prices are reported to be above the support. SCAM, normally, buys little durum, barley and maize. The support price is 1000 Dhs/mt and there is no ceiling. SCAM has purchased a considerable quantity of barley this year and some barley will probably be exported.

Purchasing agents (cooperatives or licensed private traders) are subsidized by the government agency ONICL for handling costs--a charge of 32 Dhs/mt is paid for wheat, 20.50 Dhs/mt for barley and 23.0 for maize. This charge is passed on to the mill. Storage charges are also paid by ONICL on a monthly basis of about 20 Dhs/mt month for wheat, 17.5 Dhs/mt month for barley, 19 Dhs/mt month for maize and are guaranteed for 10 months. The storage charge includes interest on inventory, depreciation, insurance, weight loss and operating supplies such as tarpaulins, bags and fumigants. Some of these items are of such a nature that they should be combined with the handling charge; that is they depend more on the quantity handled rather than the time in storage, e.g., bags. In order to keep the SCAM's in a moderately viable financial position they are guaranteed 10 months of storage and apparently tend to keep grain for that period. This may result in some unnecessary losses, particularly when grain is stored outside on plinths. Imported wheat may also be distributed through the same purchasing agents and presumably the same handling and storage charges would be allowed.

Consumer Subsidy

The major portion of the consumer subsidy on wheat flour is incurred at the flour mill and is achieved by setting the selling price of wheat flour below the real costs associated with the raw product and milling. Table 4.1 shown below gives a breakdown of these costs.

Table 4.1

Flour Mill Margins*

(1)	Flour mill pays for wheat	1432
(2)	Wheat cost per mt of flour @ 78% extraction	1836
(3)	Operating costs allowed are:	
	(a) Handling costs (frais d'Approche)	17
	(b) Milling Costs	90
(4)	Total costs to mill	1943
(5)	Value of byproducts (Son (Bran) and farine de conde (middlings))**	- 113
(6)	Net cost of flour	1830
(7)	ONICL subsidy	710
(8)	Selling price of wheat flour	1120

*These estimates are approximate because superior flour sells at a slightly higher price, 1340 Dhs/mt, and byproduct ratios may vary slightly.

**Bran is reported to sell at 400 Dhs/mt and middlings at 650 Dhs/mt.

Internal Transport

In regard to the transport of cereals, ONICL (Office National Interprofessional Des Cereals et Legumes) is the government agency with the ultimate responsibility for the distribution of imported grains. ONICL provides the direction for the timing, mode of transport, and degree of placement from the ports to storage facilities and for mills of all imported cereals and pays the associated storage and transport costs. Increases in imports and motor carrier and rail costs have increased ONICL's total cereal transport bill from DH 20 million in 1973-74 to over DH 99 million in 1981-82. Of the DH 99 million spent in 1981-82, 52.5 percent paid for the transport of soft white wheat, 40.1 percent for wheat flour, with the remainder being spent to transport durum, wheat, barley, pulses, feed grains and rice. This represented an actual physical movement of 667,000 metric tons (9,870,000 TKm) of grain and 554,000 metric tons (11,610,000 TKm) of flour.

The National Transport Office (ONT) is an independent public agency regulating all land transport of freight or passengers. ONT exercises its greatest authority to intercity, common-carrier, road freight. The ONT sets freight rates, hires transport that is required by the government, maintains freight depots, and allocates freight to the common-carrier fleet. Private carriers exist in much greater numbers than public carriers.

In 1981, ONT issued 2119 licenses to privately owned trucks (usually over 5 tons) to perform as common carriers. Of these, 445 or 21 percent (17.5 percent tonnage capacity) may be used to haul cereals in bulk or bags. Bulk cereal loads are often transported in dump trucks as no trap bottom trucks exist for this purpose. In addition to the common-carriers, private concerns such as flour mills may own and operate trucks. These trucks may be used only to transport the commodities inbound or outbound to their operations but may be leased for defined periods to other mills. Shipments of wheat and flour in 1980 and 1981 are shown in Table 4.2 below.

Table 4.2
Amount of Grain and Flour Shipped By Truck

Grain	Total Tonnage Shipped (thousands)	Ton-Km Shipped (millions)	Average Km Shipped
1980	390	5.22	13.2
1981	66	9.87	14.7
Flour			
1980	282	5.85	20.7
1981	554	9.87	20.9

ONICL makes the decision on quantity, timing, destination and mode of transport. A shipping order is sent to ONT describing the origin-destination, tonnage and time period in which the shipment must be completed. If the amount is in excess of 1000 tons and the period of completion is relatively short, ONICL is requested to give ONT 15 days notice. For small quantities, e.g., 10-15 tons, two days notice is required. Upon receipt of the shipping order ONT contracts with the licensed privately-owned carriers to perform the operation.

The rate paid to carriers is negotiated between ONT and ONICL. ONT monitors the costs of transport inputs (e.g., equipment, petroleum, labor) and determines a rate adequate to compensate carriers for their operations. The rate is then presented to ONICL who approves the rate sometimes after protracted negotiations. The rate must be renegotiated each year and there are no minimum volume guarantees.

The basic rate for hauling any cereal product is currently DH 0.2431 per ton per kilometer. The basic rate may be increased (usually in 10% increments) based on a mix of road conditions (4 categories), timing (both advanced and interval), congestion, local costs of petroleum, sacked or bulk grain, and type of vehicle to name the more predominant factors. Carrier bills are paid by ONT every 10 days and ONT is reimbursed by ONICL. A motor carrier carries an average of 25 tons with 30 tons being the maximum weight limit on primary arteries.

There is some evidence that rates have lagged somewhat behind the costs of transport. ONT admits to an increased frequency of "illegal transport," for instance when a shipper contracts outside the regulated system for transport. Another indication occurred during the 1981 import peak when carriers were directed to haul because carriers would not perform at the given rate. Such a lag between costs increases and rate increases is not unusual in an economically regulated environment. The lag occurs because of the time between when a carrier perceives income from operations are not covering full costs (fixed costs often remaining elusive), the ONT discovers the shortfall and may negotiate a new rate with ONICL. A lag of two years would be conservative and more detrimental during times of rapidly inflating carrier input costs. A new truck costs approximately DH 650,000 (dump truck running more) and is normally financed over 2 years at 15 percent interest.

ONCF (Office National des Chemins de Fer)

Although ONT is responsible for all land transport regulation, in practice ONCF (National Railroad Office) maintains a high degree of autonomy operating the 1200 mile, standard gauge rail network. The rail lines outlined in Figure 1 were built between 1912 and 1936 by four private rail companies. The main line runs from Marrakesh through Casablanca, Rabat, Fey and Meknes to Oujda. Branching are lines to Safi, Oued Zem, Tangier and Talzaza, south of Oujda. The rail system and its operation were nationalized in 1963 except for a short piece between Bon Arfa and Talzaza.

Nearly 80.2 percent of all tonnage originated was phosphate traffic, the remainder transported consisted of petroleum, coal, ore, cereals and other commodities. Imported cereals (3 percent of tonnage originated) are shipped by rail from Casablanca, Safi, Kenitra and occasionally Tangier. Primary destinations for rail traffic include Fes, Meknes and Oujda.

As is the case with motor carriers, ONICL decides when grain will be shipped, and the destination. A shipping order is issued to ONCF detailing this information and ONICL is billed for each individual move. If the final destination is to a non-rail terminal, grain transfers from rail to motor carriers are performed by mechanical (conveyor or dumped from elevated hopper cars directly into trucks) or pneumatic systems. Rail operations within the port are performed by independent port switching operators with ONCF performing only long haul carriage.

The rail car fleet totals over 11,000 cars and include: 3,320 hopper cars, 2,330 flat cars, 2,000 flat cars with sides, 2,010 boxcars, with the remainder being tanks and other specialty cars. Of the 3,320 hopper cars, 250 are set aside to handle grain only. These hopper cars, the primary conveyance for grain, have a volume capacity of 45 cubic meters (6.52 M length, 3.17 M width and 3.0 M height) and a maximum weight capacity for grain of 50 tons. The hopper cars are assembled in Morocco but the parts must be imported.

Rail rates are based on commodity composition and value, quantity and distance shipped. The kilometer per ton rate for cereals (DH 0.139) is lower than other commodities, for example, sugar and other processed agricultural products (DH 0.162), petroleum (DH 0.189), and machinery and parts (DH 0.209). ONCF relies on general rate increases across all commodities rather than commodity specific increases as is the case with motor carrier rates. A minimum tonnage charged is assessed cereal shipments less than 30 tons for hopper cars and 10 tons for sacked grain in boxcars. An origin/desgination charge for all commodities of DH 6.62 per ton encourages the use of rail carriage for longer hauls for which this mode has a greater comparative advantage over motor carriers. Using the basic motor carrier rate against the rail rate for cereals, the rail mode would be used only for distances in excess of 63.6 kilometers for bulk shipments in excess of 30 tons.

Another component of rail rates is a demurrage charge for cars not loaded or unloaded after a specified time. Currently per car charges for cereals are DH 99.38 for the first day, DH 149.09 for the second day and DH 138.78 for each day thereafter. Demurrage charges are meant to perform as an incentive for shippers to load or unload cars promptly. The import levels of 1981 strained port and inland storage capacity to the extent that some receivers, especially mills, would order in excess of throughput and use railcars as storage. Charges for covered storage are DH 0.70 per ton per day as opposed to rail car (50 ton load) demurrage charges of DH 2.58 per ton per day. Port and rail authorities have charged that although this differential exists a large rail car capacity shortfall exists at times due to delays in unloading at mills especially. One reason for this could be that ONICL pays for storage and transport of all cereals. If a mill is faced with a decision to build storage or allow for storage in rail cars, a mill seems to prefer the latter. Logic seems to suggest that the rate paid to mills for storage is not sufficient to encourage increased storage capacity at mill locations.

In 1981 and 1982 ONCF reports it carried cereals from the following ports:

Port	1981 Total Tonnage (Thousands)	1982 Total Tonnage* (Thousands)
Casablanca	550	325
Safi	210	137
Kenitra	31	23
Tangier	--	14.4

*From September through June

Distribution from each port for 1982 has been:

Port	Province	Tonnage	Distance	Thousands
Casablanca	Meknes	65	297	3114
	Fes	99	352	5499
	Oujda	90	705	9415
	Rabat	15	107	322
	Taza	15	471	1081
	Mohammedia	8	35(E)	92
	Other	33		
Safi	Marrakesh	84	226	3194
	Benachid	31	276	1394
	Benguiria	12	145	321
	Qued Zem	10	383	598
Kenitra	Local Delivery	6	10(E)	48
	Sicli Slimane	10	75(E)	170
	Soukel Arbaa	6	139(E)	155
	Sidc Kacem	1	84(E)	18
Tangier	KSAR	13	105	275
	Sour Arbaa	1.4	146	38
TOTAL		499.4		25,734

1/ (E) indicates estimated distances.

V. CURRENT PLANS FOR EXPANSION

The Ministry of Agriculture has prepared two separate proposals for expanding port and inland grain storage and handling capacity. The first envisioned storage requirements by 1990. The second, while developed along similar assumptions, was somewhat less ambitious outlining specific investments between 1981-85. Table 5.1 summarizes the details of the two proposals.

The estimate of port and inland storage requirements in 1990 was based on the following assumptions:

(1) That domestic cereal consumption will increase by 6% per year and reach 9.0 million metric tons by 1990.
(2) That domestic production will increase by 3% per year and reach 6.0 mmt necessitating imports of 3.0 mmt
(3) That the demand for flour will increase by 4.0% requiring the construction of 30 new flour mills (71 currently are in operation) thereby increasing domestic milling capacity by .78 mmt.
(4) That a food security reserve of 1.17 mmt would need to be established in order to stabilize cereal availability.

Given these assumptions, The Ministry of Agriculture estimated that an additional 230,000 metric tons of port storage (106,000 mt. currently) would be required with an additional 1.9 million metric tons inland. Out of this inland capacity approximately 760,000 metric tons was to be located at either the local cooperatives, licensed traders or the flour mills. No location was specified for the 1.17 mmt food security reserve, however this reserve was to be controlled by an entirely new entity, such as a National Food Corporation. Total costs of this expansion were estimated to be Dh 2,892 million ($452 million), Dh 468 million ($78.0 million) at the port and inland respectively.

The revised proposal for 1981-85, still called for a major expansion at the port (190,000 mt.), but essentially dropped the idea of establishing a separate food security reserve outside normal commercial channels. Notably, this revised proposal called for an increase in the level of storage initially recommended for the cooperatives and reduced that initially recommended for the licensed traders and the flour mills. Total costs were estimated to be Dh 1,516 million ($253.0 million).

Table 5.1

Planned Expansion of Port and Inland Storage Facilities

I. Initial Plan for 1990	Number	Type	Capacity (metric tons)	Cost (Dh Mil.)	Cost ($ Mil.)
A. Port Storage*					
Agadir	1	Silo	50,000	105.0	17.5
Laayoune	1	Silo	50,000	105.0	17.5
Nador	1	Silo	30,000	48.0	8.5
Jorf Lasfar	1	Silo	50,000	105.0	17.5
Safi	1	Silo	50,000	105.0	17.5
			230,000	468.0	78.0
B. Inland Storage					
National Corp.	59	Silo	1,170,000	1,475.0	245.8
SCAM/CMA	30	Silo	300,000	360.0	60.0
Licensed Traders	13	Silo	260,000	325.0	54.2
Flour Mills	30	Silo	198,000	264.0	44.0
	132		1,928,000	2,424.0	374.0
II. Revised Proposal 1981-85[b/]					
A. Port Storage					
Tangier	1	Silo	100,000	247.0	41.2
Nador	1	Silo	30,000	48.0	8.0
Agadir	1	Silo	30,000	48.0	8.0
Laayoune	1	Silo	30,000	48.0	8.0
	4		190,000	391.0	65.2
B. Inland					
GVT	na	Silo	180	na	na
SCAM/CMA	na	Silo	520	na	na
Licensed Traders	na	Silo	100	na	na
Flour Mills		Silo	100	na	na
	45		900	1,125.0	187.5

*In the initial proposal Tangier Port ranged in capacity between 30,000-100,000 mt.

a/ Ministere De L'Agriculture Et De La Reforme Agraire, Project Stockage Des Cereales, Etode Preliminaire.

b/ Office National Interprofessionnel Des Cereales Et Des Legumineuses (ONICL), Plan Quinquennal De Development Economique 1981-1985 (Les Progromme D'Action En Matiere De Reception Stockage Et Tranformation Et Transport).

ONICL, Fiche - Relative Aux Projets De Construction, Rabat, 18 Octobre 1982.

VI. ECONOMIC FEASIBILITY OF PROPOSED EXPANSION

The assumptions on cereal production, consumption and imports underlying the proposed expansion that were outlined in Section V are reasonable given past trends (refer to section II). However, the coinciding increase in storage capacity is somewhat questionable on economic grounds. As will be shown in this section, if fully implemented the plan could result in capacity nearly double requirements. As a way of illustrating where critical needs lie, the section first reviews utilization rates of existing capacity at both the port and inland as a means of determining how much and where any new capacity should be constructed. Thereupon the relative merits of constructing the proposed port facilities at Tangier, Nador and Agadir are reviewed in light of the location and magnitude of Morocco's provincial level food deficits. Similarly, the relative merits of building more inland stroage at the SCAM/CMA cooperatives and at the flour mills is addressed. Cost estimates for both port and inland storage facilities are then presented which can be used as the basis for determining project costs.

Utilization of Existing Capacity

It is fair to say that Morocco doesn't fully utilize all of its public and private storage at the same point in time. During good production years and low imports, port facilities will quite naturally be underutilized. Similarly, inland facilities such as those controlled by the SCAM/CMA cooperatives which are primarily used to procure domestic production as part of an overall price support operation, will be fully utilized during good crop years and only partially utilized during years of drought. The only major exception to this rule would tend to be utilization of the storage capacity located at the flour mill which one would expect to be relatively constant in order to meet monthly raw product (wheat) requirements; the amount of stock required generally being a function of milling rates and delivery schedules. The following sections review utilization rates at the three major ports that have bulk handling and storage capability and at the flour mills inland. These rates are considered for both current and future years.

Port Facilities

Of the seven ports that received grain in 1981- Casablanca (1.6 mmt), Safi (.36 mmt), Tangier (.22 mmt), Agadir (.14 mmt), Kenitra (.08 mmt) and Nador (.05 mmt)--only three, Casablanca, Safi and Kenitra have bulk handling capability, i.e., silos with either pneumatic or mechanical unloading. As can be seen in Table 6.1 during 1981, a peak import year, Casablanca and Safi operated at or above rated capacity. Morocco's only other port with covered storage but not bulk handling capability, Tangier, also operated at near capacity. Meanwhile Kenitra operated at roughly half of rated capacity. One possible explanation for Kenitra's lower utilization could be due to the limited port depth in comparison to Casablanca and Tangier.

Table 6.1

Utilization of Existing Storage Capacity

Port Storage	Storage Capacity (mt)	Unloading Capacity (mt/hour)	Max. Tonnage (mil mt)	Hypothetical Turnover (per year)	1981 Actual Turnover (per year)	Utilization Rate (%)
Silo						
1. Casablanca	70,000	220	1.40	20.0	23.0	104.0
2. Safi	24,000	160	.36	15.0	15.0	100.0
3. Kenitra	12,000	120	.18	15.0	7.0	46.6
Covered Flat						
4. Tangiers	16,000	40	.24	15.0	14.0	93.3

Table 6.2

Projected Cereal Imports and Port Handling Capacity

Commodity	Projected Imports		
	1982/83 (1,000 mt)	1985/86 (1,000 mt)	1990/91 (1,000 mt)
Soft Wheat	2,000	2,400	2,780
Maize	165	247	452
Total	2,165	2,647	3,232

Port Facility (1,000 mt)	Port Handling Capacity 1982/83 (1,000 mt)	1985/86 (1,000 mt)	1990/91
Existing			
Casablanca	1,400	1,400	1,400
Safi	360	360	360
Kenitra	180	180	180
Subtotal	1,940	1,940	1,940
Planned a/			
Tangier	--	2,000	2,000
Nador	--	450	450
Agadir	--	450	450
Laayoune	--	450	450
Jorf Lasfar	--	--	1,000
Subtotal	--	3,350	4,350
TOTAL	1,940	5,290	6,290

a/ Size and turnover rates are, respectively: (100,000 mt @ 20), (30,000 @ 15), (30,000 @ 15), (30,000 @ 15) and (50,000 @ 20).

Whether or not these facilities will be adequate to handle future imports is of course dependent on the level and composition of those imports which is in turn a function of growth in domestic cereal consumption and production. Table 6.2 compares a projection of future cereal imports (soft wheat and maize) against existing and future handling capacity. As can be seen in the table, while there is a clear need for more port storage and handling capacity, if the planned expansion outlined in Table 5.1 were fully implemented it would exceed future requirements. Whereas by 1985/86 approximately 2.6 million metirc tons of cereal imports will be required total import capacity would be nearly 5.3 mmt. according to the plan. Similarly, while 3.2 mmt. of import (handling) capacity will be required by 1990/91, the construction of a 50,000 mt. storage facility with a handling capacity of 1.0 mmt. would increase total handling capcity to 6.3 mmt., nearly twice the level of projected imports.

Nevertheless, there is a need for an additional 700,000 metric tons and 1,300,000 metric tons of handling capacity to meet foreseeable needs through 1985/86 and 1990/91 respectively. At issue is where this additional port capacity should be located.

Inland Facilities

The extent to which inland facilities are being fully utilized is not as easily discernible as in the case of port facilities. Province level data on turn-over rates of traditional storage is lacking. While some aggregate statistics are available for the licensed traders and the cooperatives, similar disaggregated data for each province was not readily available. Consequently this section focuses primarily on utilization of storage capacity at the flour mills.

Referring back to Table 3.4, there is roughly 249,000 mt. of storage at the 71 flour mills - 152,000 mt., 74,000 mt. and 23,000 mt. of covered, silo and open-air storage respectively. As mentioned in Section III it appears that the extent to which each flour mill can handle bulk wheat varies. Thus turn-over rates for each type of storage facility probably differs considerably between individual mills. As a point of departure it is assumed that each flour mill can fully utilize its milling capacity when handling bulk commodities and that consequently only the silo storage will be utilized. If this is the case, then the flour milling industry as a whole can maintain about two weeks of stock. Whether or not this capacity is sufficient to assure a steady supply to the flour mills is unknown and an area for futher study.

Port Selection

A number of factors must be considered other than potential savings on inland transportation charges when selecting the port or ports for the location of new silo and handling facilities. They include the ability to handle ships of sufficient capacity, the availability of space at the port site, and the extent to which existing port facilities can be improved and their handling capacity increased. Of the ports discussed in Section III, Jorf Lasfar and Mohammedia are both undergoing construction; so cannot be considered in terms of being readily available for silo construction to begin

at this time. In the case of Jorf Lasfar, it appears that construction of a silo could not begin for at least two years in order for the recently constructed quays to settle. In the long run, either port could be used as an alternative to Casablanca which is overly congested. Both would offer a sizable inland transportation savings to Fes, Meknes, or Oujda, the principal destinations for cereals transshipped through Casablanca. In addition, given Jorf Lasfar's ability to handle large ocean vessels (60-65,000 mt), there is also the potential to realize significant savings in ocean transportation charges.

Safi, Casablanca, and Kenitra all presently are the recipients of imported cereals. The first two may not be considered for new silos because they lack the space at port for additional storage capacity. Both ports have plans to increase present grain handling capacity. However, Kenitra, because of its shallow depth (3.5 meters), would not be able to handle an ocean vessel with enough size to make a new, large capacity silo a practical investment.

Agadir presently receives grain (137,000 tons in 1981) and is slated for a temporary, 20,000 ton silo construction. The reasons for importing grain for basically local consumption (60 Km radius) is obvious considering its location. If the 1981 cereals had arrived at the closest port to Agadir, Safi (370 Km), the additional transport cost is conservatively estimated at Dh. 12.3 million. The cost would be somewhat less if Agadir had a rail connection to the main line. The question, then, is not so much of transport savings but rather one of recovering handling costs and grain losses with the introduction of a new grain facility. The cost of a temporary 20,000 ton silo is estimated by the Ministry of Agriculture at Dh. 16 million. A temporary facility is being suggested as a new port is scheduled to be built at another location near Agadir.

Tangiers and Nador are two ports with sufficient depths and port space to accommodate a silo and grain handling facility. Both have, or will shortly have, rail service connecting to the main rail line. Both currently receive grain (Tangiers - 216,000, Nador - 50,000 in 1981) and are actively being considered as potential sites for silo construction.

As can be seen in Table 6.3 the primary justification for a new facility at Nador is to minimize inland transportation charge to Qujda. If for examplae a 20,000 mt grain storage and handling facility were constructed at Nador , it would be able to supply wheat to the flour mills in Nador (1 @ 30,576 mt) and Qujda (5 @ 132,962 mt), in addition to occassionally supplying the needs at Fes. Although the facility would be operating at roughly two-thirds rated capacity initially (200,000 mt of imports versus 300,000 mt rated capacity), utilization should increase as new flour mills are constructed in Nador and in the surrounding provinces. More importantly, given inland transportation savings of Dh. 79.4 ($13.23) on each ton of grain shipped to Qujda through Nador versus Casablanca, construction of the facility would result in total savings of Dh. 10.56 million ($1.76 million) annually. These savings would essentially cover the initial investment costs ($12.3 million) within seven years.

Whether or not an additional facility at Tangier is economic is dependent upon several factors: (1) potential savings in reduced handling costs and physical losses at Tangiers that would result in a move toward silo storage and pneumatic unloading; (2) the cost of converting local flour mills to handle bulk wheat; and (3) the relative savings in inland transportation charges associated with supplying Meknes and Fes from Tangier versus the costs associated with under utilizing Casablanca.

Although it is doubtful that a 100,000 mt facility at Tangier would be economic, there may be potential for a smaller facility somehwere between 20,000 mt to 60,000 mt depending on whether or not Fes (15 mills @ 220,941 mt) and Meknes (6 mills @ 180,198 mt.) are to be supplied in addition to the flour mills surrounding Tangier (3 @ 74,559 mt) and Tetouan (4 mills @ 62,396 mt). In total the mills in these four provinces require more than 536,000 mt of wheat annually. At first glance it would appear that a smaller facility may be more desirable in light of the potential to construct a large facility at Jorf Lasfar. Although inland transportation charges may be slightly higher, this factor will be more than counterbalanced by the savings in ocean transportation charges associated with Jorf Lasfar's ability to handle 60-65,000 mt vessels.* This of course assumes that rail service to Jorf Lasfar will become available in the near future.

*According to a study by Binkley and Hanes, AJAE, Vol. 63, Feb. 1981, increasing the size of the ocean vessel by 5,000 mt. reduces ocean transportation charges by $2.00/mt of grain shipped.

Table 6.3

Distances and Charges from Three Major Ports to Destinations, Rail and Truck, 1982

Origins		Destinations: Meknes Km	Meknes Dh./Ton	Fes Km	Fes Dh./Ton	Oujda Km	Oujda Dh./Ton
Tangier	Truck	243	59.1	303	73.6	646	157.0
	Rail	252	41.6	307	49.3	660	98.4
Nador	Truck	394	95.8	334	81.2	140	34.0
	Rail	416	64.4	361	56.8	134	25.2
Casablanca	Truck	230	55.9	290	70.5	616	149.7
	Rail	297	47.9	352	55.5	705	104.6

Assumptions:
*The new rail line from Nador to Oujda will be 71 Km, 63 Km from Oujda.
*Rail rates are based on Dh. 0.139 per Km per ton, Dh. 6.62 fixed charge.
*Truck rates are based on Dh. 0.2431 per Km per ton.

Cost of Constructing and Operating New Port Facilities

The following cost estimates are presented to facilitate project appraisal and to evaluate the relative costs and benefits associated with port facilities of different sizes operating at different turn-over rates. Two typical port unloading and storage installations were considered. One has a ship unloading rate of 300 mt/hr and the other a ship unloading rate of 1,000 mt/hr. The smaller facility would handle ships of 15,000 to 20,000 mt capacity, hence, 20,000 mt of silo storage is provided. The load out capacity was assumed to be 2,500 mt per eight hour day (85 percent bulk and 15 percent bagged). The larger facility would handle ships of 50,000 mt to 60,000 mt capacity, hence a 60,000 mt storage facility is provided. The load out rate was assumed to be 2,500 mt per eight hour day, but based on two shifts per day for loading.

Cost estimates for equipment were furnished by Buhler-Miag AG of Braunschweig, West Germany. They also specified the amount of concrete required for 2,000 mt silos and the concrete, in place, was priced at $500/M3 as provided by SOMAGENIE of Rabat. Table 6.4 shows the total port elevator investment costs, these costs include some expense for piling under the silos but this cost could vary considerably depending upon soil strength found when soil tests are made at the site. The design is based upon seismic loading of 6.5, Richter Scale.

Operating costs were based upon handling 300,000 mt./year through the smaller facility and 1,000,000 mt./year through the larger. Estimated costs per ton are $8.75/mt. (54 Dhs/mt.) and $7.51/mt. (46 Dhs/mt.) respectively for the smaller and larger facility (Tables 6.5 and 6.6).

Cost of Inland Storage

Read Steel Products, Inc. of Birmingham, Alabama furnished cost estimates of three sizes of inland storage installations.

(a.) a 60,000 mt storage facility;
(b.) a smaller 20,000 mt facility for loading out bulk and bagged grain; and,
(c.) a 6,000 mt facility which would be typical of a bulk facility for a flour mill.

The investment costs are shown in Table 6.7 for the three sizes of facilties. The change in investment costs for adding, or deleting a 6,000 mt. storage silo would be about $150,000. For a 60,000 mt. facility with concrete storage silos, the cost is estimated to increase from $5,540,000 to $16,000,000.

Tables 6.8, 6.9, 6.10 show estimated total storage costs for the three sizes of facilities and for different rates of turn-over -- 1, 6 and 12 times per year. For the 60,000 mt facility, the cost increases from $4.77/ mt to $32.54/mt handled as the turnover rate is reduced from 12 to one time per year. The cheapest storage costs are at the flour mills where two major savings are possible: supervisory costs are reduced and there is no bag cost. This indicates the desirability of putting as much increased bulk storage as possible at flour mills and first priority should be given to those mills which are or could easily be served by rail.

Table 6.4 Estimated port elevator investment costs

Cost item	300 T/hr unloading 20,000 T. storage	1,000 T/hr unloading 60,000 T. storage
Grain unloading, conveying, silos, and bagging equipment	7,400,000 1/	19,750,000 1/
Site preparation, piling, rail siding, roads add 35% of base	2,590,000	6,900,000
Engineering design and supervision add 12%	1,200,000	3,200,000
Contingency add 10%	1,120,000	3,000,000
Total	12,300,000	32,800,000

1/ Cost estimates from Buhler-Miag, AG, Braunschweig, West Germany.

Table 6.5 Estimated port grain handling costs
(300,000 T/yr handled, 300 T/hr, 20,000 T storage)

Cost item	Turnovers per year 15
Investment	$12,300,000
FIXED COSTS	
Depreciation (30 yr.)	410,000
Interest on ½ of investment at 12%	740,000
Interest on stock @ 12% on $225/T stock (assume ½ filled during year)	270,000
Insurance @ 2% (Facilities at cost and stock at $225/T)	340,000
Maintenance @ 1% of facility cost	120,000
TOTAL FIXED	1,880,000
LABOR COSTS	
Supervisory (3)	30,000
Office (3)	8,000
Operating labor (20) @ $7/day	35,000
TOTAL LABOR COSTS	73,000
TOTAL FIXED, ANNUAL	1,953,000
FIXED COSTS $/T HANDLED	$6.51
OPERATING COSTS $/T HANDLED	
Electrical power (4KWH/T handled @ .06)	.24
Bags (@ $10/T on 15% of tons handled)	1.50
Other (estimated)	.50
TOTAL OPERATING COSTS PER TON HANDLED	2.24
TOTAL COST, $/T HANDLED	$8.75

Table 6.6 Estimated port grain handling costs
(1,000,000 T/yr handled, 1,000 T/hr, 60,000 T storage)

Cost item	Turnovers per year 20
Investment	$32,800,000
FIXED COSTS	
Depreciation (30 yr.)	1,100,000
Interest on ½ of investment at 12%	2,000,000
Interest on stock @ 12% on $225/T stock (assume ½ filled during year)	810,000
Insurance @ 2% (Facilities at cost and stock at $225/T)	926,000
Maintenance @ 1% of facility cost	330,000
TOTAL FIXED	5,166,000
LABOR COSTS	
Supervisory (3)	30,000
Office (3)	8,000
Operating labor (35) @ $7/day	61,000
TOTAL LABOR COSTS	99,000
TOTAL FIXED, ANNUAL	5,265,000
FIXED COSTS $/T HANDLED	$5.26
OPERATING COSTS $/T HANDLED	
Electrical power (4KWH/T handled @ .06)	.24
Bags (@ $10/T on 15% of tons handled)	1.50
Other (estimated)	.50
TOTAL OPERATING COSTS PER TON HANDLED	2.24
TOTAL COST, $/T HANDLED	$7.51

Table6.7 Investment costs for inland bulk grain handling and storage facilities

Cost item	Capacity, tonnes 60,000	20,000	6,000
Grain receiving, unloading, conveying, storage and bagging (materials and erection costs using metal bins) 1/	$3,600,000	$1,600,000	$900,000
Site preparation, office, laboratory, fencing, roads and rail siding @ 25% of base	900,000	400,000	200,000
Engineering, design and supervision, add 12%	540,000	240,000	132,000
Contingency, add 10%	500,000	220,000	123,000
TOTAL	$5,540,000	$2,460,000	$1,355,000
Add for each additional (or subtract for less) 6,000T storage	$150,000		
Total for 60,000T with concrete storage rather than steel tank storage	$16,000,000		

1/ Cost estimates furnished by Read Steel Products, Inc., 906 N. 40th St., Birmingham, Alabama.

Table 6.8 Estimated annual grain storage costs
60,000-tonne inland storages

Cost item	Turnovers per year 1	6	12
Investment	$5,540,000	$5,540,000	$5,540,000
FIXED COSTS			
Depreciation (30 yr.)	185,000	185,000	185,000
Interest on ½ of investment at 12%	330,000	330,000	330,000
Interest on stock @ 12% (assume ½ filled during year)	810,000	810,000	810,000
Insurance @ 2% (Facilities at cost and stock at $225/T)	381,000	381,000	381,000
Maintenance @ 1% of facility cost	55,000	55,000	55,000
TOTAL FIXED	1,761,000	1,761,000	1,761,000
LABOR COSTS			
Supervisory (2)	20,000	20,000	20,000
Office (3)	8,000	8,000	8,000
Operating labor (18) @ $7/day	31,000	31,000	31,000
TOTAL LABOR COSTS	59,000	59,000	59,000
TOTAL FIXED, ANNUAL	1,820,000	1,820,000	1,820,000
FIXED COSTS $/T HANDLED	$30.30	$5.06	$2.53
OPERATING COSTS $/T HANDLED			
Electrical power (4KWH/T handled @ .06)	.24	.24	.24
Bags (@ $10/T on 15% of tons handled)	1.50	1.50	1.50
Other (estimated)	.50	.50	.50
TOTAL OPERATING COSTS PER TON HANDLED	2.24	2.24	2.24
TOTAL COST, $/T HANDLED	$32.54	$7.30	$4.77

Table 6.9 Estimated annual grain storage costs
20,000-tonne inland storages

Cost item	Turnovers per year 1	6	12
Investment	$2,460,000	$2,460,000	$2,460,000
FIXED COSTS			
Depreciation (30 yr.)	82,000	82,000	82,000
Interest on ½ of investment at 12%	148,000	148,000	148,000
Interest on stock @ 12% (assume ½ filled during year)	270,000	270,000	270,000
Insurance @ 2% (Facilities at cost and stock at $225/T)	139,000	139,000	139,000
Maintenance @ 1% of facility cost	25,000	25,000	25,000
TOTAL FIXED	664,000	664,000	664,000
LABOR COSTS			
Supervisory (2)	20,000	20,000	20,000
Office (2)	6,000	6,000	6,000
Operating labor (10) @ $7/day	18,000	18,000	18,000
TOTAL LABOR COSTS	44,000	44,000	44,000
TOTAL FIXED, ANNUAL	708,000	708,000	708,000
TOTAL FIXED $/T HANDLED	$35.40	$5.90	$2.95
OPERATING COSTS $/T HANDLED			
Electrical power (4KWH/T handled @ .06)	.24	.24	.24
Bags (@ $10/T on 15% of tons handled)	1.50	1.50	1.50
Other (estimated)	.50	.50	.50
TOTAL OPERATING COSTS PER TON HANDLED	2.24	2.24	2.24
TOTAL COST, $/T HANDLED	$37.64	$8.14	$5.19

Table 6.10 Estimated annual grain storage costs
6,000 tonne flour mill storage
(12 turnovers per year)

Cost Item	Cost
Investment	$1,355,000
FIXED COSTS	
Depreciation @ 30 yr.	45,000
Interest on ½ investment @ 12%	81,000
Interest on stock @ 12% (Assume ½ filled during year and $225/T)	81,000
Insurance @ 2% (Facilities at cost and stock @ $225/T	54,000
Maintenance, 1% at Facility Cost	14,000
TOTAL FIXED	275,000
LABOR COSTS 1/	
Operating Labor (2)	3,500
TOTAL FIXED, ANNUAL	278,500
TOTAL FIXED, $/T HANDLED	3.87
OPERATING COSTS, $/T HANDLED	
Electrical (4KWH/T @ .06)	.24
Other	.50
Total Operating	.74
TOTAL COSTS, $/T HANDLED	4.61

1/ Assumes that supervisory and office functions now include grain storage functions.

PRINCIPAL CONTACTS

Ministry of Agriculture

Mr. Othman Demnati, Minister of Agriculture
Mr. Ahmed El Alaoui El Abdellaoui, Secretary General
Mr. Abdelhai Bouzoubaa, Director of Vegetable Production Division
Mr. Abdelhakim Saissi, Director of Planification and Economic Affairs Division
Mr. Abbes Marsile, Director of Livestock Division
Mr. Taleb Bensouda, Assistant Director of Livestock Division
Mr. Mohamed Mouline, Director of Agrarian Reform Division
Mr. Chelouati, Coordinator in charge of Cooperation
Mr. Mohamed Sbitri, Division of Planification and Escort of Team
Mr. Abdelaziz Arifi, Director of Plant Protection Division
Mr. Driss Kelili, Assistant Director of Plant Protection Division
Mr. Mohamed Guerraoui, Inspector
Mr. Mohamed Bentouhami, Feed Specialist, Livestock Division
Mr. Othman Lahlou, Provincial Director for Kenitra
Mr. Mohamed Benhiba, Provincial Director of Khemisset
Mr. Albert Sasson, Assistant Director of Vegetable Production Division
Mr. Mustapha Serghini, Assistant Director of Agrarian Reform Division

Ministry of Commerce

Mr. Mustapha Slimani, Director of Agro-Industry

Ministry of Cooperation

Mr. Mohamed Rahmani, Director of bi-lateral Cooperation

Ministry of Equipment

Mr. Mohamed Layachi, Director of Secondary Ports
Mr. Mohamed Bachiri, Assistant Director of Secondary Ports

Ministry of Finance

Mr. Mohamed Seqat, Director of Budget
Mr. Mohamed Essaghir, Assistant Director of Budget
Mr. Mohamed M'Zalek Tazi, Director of External Finance
Mr. Abdelfettah Benmansour, Chief of External Finance Division
Mr. Fettouhi, Director of External Finance Section

ONICL

Mr. Mohamed Brick, Director General
Mr. Ahmed El Jaouhari, Commercial Director
Mr. Wafi Hamani, Director of Marketing

Private Sector

Mr. Ahmed El Harti, Director of Casablanca SCAM
Mr. Redouane Boujamaa, Director of USCAM
Mr. Mohamed Berrada, Director of Port Silos SOSIPO
Mr. Mohamed Raissi, President of AMIPROS
Mr. Joseph Choukroun, Secretary General of AMIPROS
Mr. Ahmed Berdai, Director of CICALIM
Mr. Tewfik Takali, Director of INAM-PROVIMI
Mr. Mohamed Smires, Director of SEPO
Mr. Mohamed Zarrouk, Director of Compagnie Financiere d'Investissements

US Embassy

Mr. Ted Curran, Deputy Chief of Mission
Mr. Joel Spiro, Economic Counselor
Mr. Robert Chase, AID Director
Mr. Forrest K. Geerken, Agricultural Attache
Mr. Lewis Forde, Interpreter
Mr. Vincent Biolley, Interpreter
Ms. Fouzia Dine, Agricultural Section
Mr. Abdellatif Belmehdi, Agricultural Specialist

U.S. Wheat Associates (Casablanca Office)

Mr. Richard C. Row, Regional Director
Mr. Mark Ellison, Marketing Director
Mr. Omar Amrhar, Coordinator