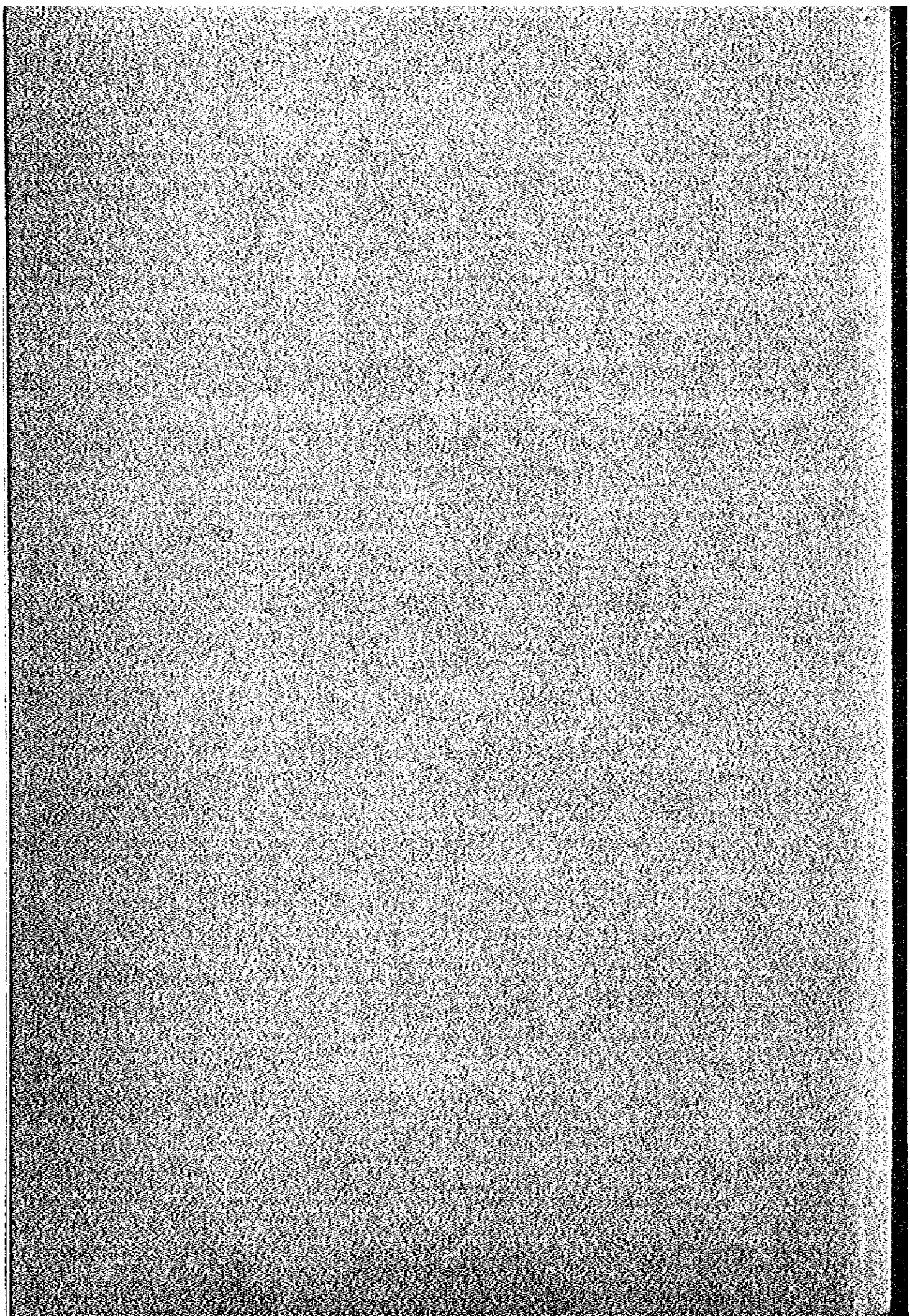


CHAPTER 9

FINANCIAL ANALYSIS



CHAPTER 9

FINANCIAL ANALYSIS

9.1 GENERAL

Financial analysis of the Nador New Airport Construction Project was carried out through calculation of financial internal rate of return (FIRR). In the evaluation process, the new airport was assumed to be managed on a self-financing basis according to the policy of Moroccan Government. Based on this assumption, the financial cost including both the capital and O&M costs was compared with actual revenues of the autonomous body of airport such as landing charge, aircraft parking charge, airport utilization fee and so on.

9.2 FINANCIAL COSTS ESTIMATION

Financial cost taken into account in the financial analysis includes those incurred for the construction, operation and maintenance including personnel cost of the new airport. Financial cost was first estimated based on the price level of the beginning of 1984 and was inflated according to the assumed rate of inflation shown below.

	<u>1984</u>	<u>1985</u>	<u>From 1986</u>
Foreign Currency	1.5%	1.5%	1.5%
Local Currency	8%	7%	6%

Remarks: Escalation is taken into consideration for construction and expansion costs.

These costs were estimated as mentioned hereunder.

9.2.1 Construction Cost

Financial cost of construction is shown in Table 8-1. Total construction cost (financial) was estimated at DH221.7 million (US\$27.5 million).

After the target year 2000, it is envisaged that the terminal building and car parking area of the new airport will be overflowed. Expansion works for the terminal building (5,000 m²) and car parking (7,200 m²) were assumed to be done from 1999 to 2000. The cost of these works was estimated at DH53.6 million (US\$6.6 million).

Equipment such as radio-navaids etc. was assumed to be replaced by 30% of their values in terms of purchased costs after 15 years of operation.

9.2.2 Operation and Maintenance (O&M) Cost

Annual operation and maintenance cost of the new airport shown in Table 9-1 are estimated in the following principle.

- 1) Annual maintenance cost of airport structures such as runway, taxiway, apron, approach road and car parking lot:
1% of the construction cost of the respective structures including pavement and drainage works but excluding grading works.
- 2) Annual maintenance cost of buildings and airport facilities and utilities:
1% of the construction cost of the respective buildings and facilities.
- 3) Annual maintenance cost of navigational aids system, rescue and fire fighting facilities as well as other relevant special equipment:
5% of the costs of purchase and installation of the respective facilities and equipment.
- 4) Annual personnel cost:
Calculated based on the actual present wages and salaries and the recommended staffing program of the Nador New Airport (Refer to Table 11-1), as shown in Table 9-2.

Table 9-1 ESTIMATED OPERATION AND MAINTENANCE COSTS
OF THE NADOR NEW AIRPORT

(At 1984 Price, Unit : US\$1,000)

Year	Operation and Maintenance						Sub-Total	Wages	Others	Total
	Civil Works	Buildings & Utilities	Navigation Aids & Other Equipment							
1989	85	100	286			471	263	37	771	
1990	85	100	286			471	268	37	776	
1991	85	100	286			471	274	37	782	
1992	85	100	286			471	280	38	789	
1993	85	100	286			471	286	38	795	
1994	85	100	286			471	295	38	804	
1995	85	100	286			471	299	39	809	
1996	85	100	286			471	311	39	821	
1997	85	100	286			471	316	39	826	
1998	85	100	286			471	320	40	831	
1999	85	100	286			471	334	40	845	
2000	85	100	286			471	337	40	848	
2001	89	162	286			537	341	44	922	
2002	89	162	286			537	355	45	937	
2003	89	162	286			537	359	45	941	
2004	89	162	286			537	373	46	956	
2005	89	162	286			537	375	46	958	
2006	89	162	286			537	383	46	966	
2007	89	162	286			537	387	46	970	
2008	89	162	286			537	394	47	978	
2009	89	162	286			537	403	47	987	
2010	89	162	286			537	406	47	990	
2011	89	162	286			537	421	48	1,006	
2012	89	162	286			537	423	48	1,008	
2013	89	162	286			537	429	48	1,014	
2014	89	162	286			537	431	48	1,016	
2015	89	162	286			537	432	48	1,017	

Table 9-2 ESTIMATED ANNUAL WAGES OF THE NADOR NEW AIRPORT

(At 1984 Price, Unit: DH 1,000)

Classification	1989	1990	1995	2000	2005	2010	2015
- Office of Civil Aviation	95	95	95	95	95	95	95
- Administration Section	137	152	167	197	228	258	304
- Navigation Section	210	210	249	287	325	382	402
- Maintenance Section	828	842	958	1,122	1,307	1,466	1,613
Maintenance Service	212	212	254	275	317	338	380
Parking "	113	113	126	151	176	201	238
Fire Security "	193	207	234	275	317	372	386
Cleaning "	112	112	134	157	179	213	213
Telecommunication "	36	36	36	48	60	60	72
Warehouse "	54	54	54	72	90	90	108
Guarding	108	108	120	144	168	192	216
- Infrastructure Section	425	438	515	593	644	644	644
- Meteorology Section	427	427	427	427	427	427	427
	2,122	2,164	2,411	2,721	3,026	3,272	3,485
(In US\$1,000)	(263)	(268)	(299)	(337)	(375)	(406)	(432)

5) Other annual operation cost:

5% of the estimated annual costs of maintenance and personnel.

Total operation and maintenance costs of the Nador New Airport as estimated on the above-mentioned basis will be DH6.2 million (US\$771,000) at the opening of the new airport.

9.2.3 Income from Land Sale

In order to partly make up the capital investment required for construction of the new airport, the Government of Morocco intends to sell the land property belonging to the existing airport. The total area of this land is about 180 ha. Calculated at the approximate prevailing price of US\$100,000 per ha in 1984, the total income expectable from land sale would be US\$18,000,000 as taken into account in the project cost estimation.

9.3 FINANCIAL BENEFITS ESTIMATION

Financial benefits of the new airport will be composed of various airport revenues collectable under the present airport tariff system of Morocco. Considering the present trend of increase of various airport charges and fees and in accordance with the recommendation from Moroccan Authority, an addition of 20% was made to the respective items under the official tariff. The revenues were thus estimated as follows:

9.3.1 Airport Tariff System

The prevailing airport tariff determined in the decrees concerned covers the following charges and fees:

- a. Landing charge
- b. Additional charge for night movements (lighting charge)
- c. Aircraft parking charge
- d. Airport utilization fee
- e. Public properties occupation charge
- f. Cargo fee
- g. Commercial activities charge
- h. Machineries and tools rental charge
- i. Aircraft sheltering charge
- j. Observation deck entrance fee

9.3.2 Airport Revenues Estimation

Airport revenues from the above-mentioned charges and fees are estimated as detailed hereafter, based on the forecast of annual aircraft movements at the new airport as shown in Table 9-3.

Besides, according to the policy of Moroccan Government that the airport to be newly constructed should be autonomous in the financial aspect, the calculation of the charges and fees was made taking into account an increase of 20% on the actual tariff, for the period from 1984 to 1988. On the above-mentioned basis, the respective charges and fees considered hereafter have been increased by 20%.

1) Landing Charge

This charge is determined according to the maximum weight and nature of the aircraft using the new airport as mentioned below:

<u>International Aircraft</u>	<u>Charge : DH/ton</u>	
	<u>Regular flight</u>	<u>Irregular flight</u>
- For the first 25 tons of weight	11.0	9.0
- From the 26th to 75th tons "	22.0	18.0
- From the 76th tons "	31.0	26.0

<u>Domestic Aircraft</u>	<u>Charge : DH/ton</u>
- For the first 14 tons of weight	6.0
- From the 15th to 25th tons "	12.0
- From the 26th ton "	22.0

Total annual revenues from landing charge calculated on the above basis are shown in Table 9-4.

Table 9-3 FORECAST OF AIRCRAFT MOVEMENTS AT THE NADOR NEW AIRPORT

Items	1989	1990	1995	2000	2005	2010	2015
(Unit : Number of landings & take-offs)							
<u>International Passenger Flight</u>							
240-Seater Jet (A-300)	456	490	680	937	1,283	1,750	2,374
120-Seater Jet (B-727 & B-737)	1,237	1,329	1,846	2,543	3,483	4,749	6,444
Sub-total	1,693	1,819	2,526	3,480	4,766	6,499	8,818
<u>Domestic Passenger Flight</u>							
120-Seater Jet (B-727 & B-737)	364	391	543	748	1,025	1,397	1,896
60-Seater Non-Jet (F-27)	893	961	1,334	1,837	2,517	3,431	4,656
Sub-total	1,257	1,352	1,877	2,585	3,542	4,828	6,522
Total	2,950	3,171	4,403	6,065	8,308	11,327	15,370

Table 9-4 ESTIMATED LANDING CHARGE OF THE NADOR NEW AIRPORT

Items	(Unit: US\$1,000)						
	1989	1990	1995	2000	2005	2010	2015
<u>International Service</u>							
A-300 Class	93 (228)	100 (245)	139 (340)	192 (469)	262 (642)	358 (875)	485 (1,187)
B-727 & B-737 Class	122 (619)	132 (665)	183 (923)	252 (1,272)	345 (1,742)	470 (2,375)	638 (3,222)
Sub-total	215 (847)	232 (910)	322 (1,263)	444 (1,741)	607 (2,384)	828 (3,250)	1,123 (4,409)
<u>Domestic Service</u>							
B-727 & B-737 Class	33 (182)	36 (196)	49 (272)	68 (374)	93 (513)	127 (699)	173 (948)
F-27 Class	7 (447)	8 (481)	11 (667)	15 (919)	21 (1,259)	28 (1,716)	38 (2,328)
Sub-total	40 (629)	44 (677)	60 (939)	83 (1,293)	114 (1,772)	155 (2,415)	211 (3,276)
Total	255 (1,476)	276 (1,587)	382 (2,202)	527 (3,034)	721 (4,156)	983 (5,665)	1,334 (7,685)

Note : Figures in parentheses indicate the number of landings.

2) Additional Charge for Night Movements (Lighting Charge)

A lighting charge is to be levied on the aircraft operating at night, according to the number of times of utilization of lighting equipment. The charge rate to be applied for the new airport is DH 120.0 (US\$14.9) for each landing and each take-off.

Table 9-5 shows the total revenue from lighting charge as estimated according to the above rate and the forecasted number (50% of aircraft movements) of flights given in the Table 9-5.

Table 9-5 ESTIMATED LIGHTING CHARGE OF THE NADOR NEW AIRPORT

(Unit: US\$1,000)						
1989	1990	1995	2000	2005	2010	2015
22 (1,475)	24 (1,586)	33 (2,202)	45 (3,033)	62 (4,154)	84 (5,662)	115 (7,605)

Note : Figures in parentheses indicate the number of aircraft operations.

3) Aircraft Parking Charge

Following rates of parking charge will be applied for parked aircraft at the new airport :

<u>Weight</u>	<u>Charge</u>
- For the first 50 tons of weight	DH5.0/ton/day
- From the 51st ton	DH2.0/ton/day

Any fraction of a ton and of a day shall be considered as one ton and one day respectively. Aircraft parking less than three (3) hours have not to pay the parking charge.

Total amount of estimated parking charge receivable by the new airport is shown in Table 9-6.

Table 9-6 ESTIMATED PARKING CHARGE OF THE
NADOR NEW AIRPORT

(Unit: US\$1,000)

Aircraft Type	1989	1990	1995	2000	2005	2010	1015
A-300 Class	0.6 (11)	0.6 (12)	0.9 (17)	1.2 (23)	1.7 (32)	2.3 (44)	3.1 (59)
B-727 & B737 Class	1.6 (40)	1.7 (43)	2.3 (60)	3.2 (83)	4.4 (113)	6.0 (154)	8.1 (208)
F-27 Class	0.2 (22)	0.3 (24)	0.4 (33)	0.5 (46)	0.7 (63)	0.9 (86)	1.3 (116)
Total	2.4 (73)	2.6 (79)	3.6 (110)	4.9 (152)	6.8 (208)	9.2 (284)	12.5 (383)

Note : Figures in parentheses indicate the number of parked aircraft.

4) Airport Utilization Fee

All passengers who use the new airport shall pay an airport utilization fee fixed at DH30.0 for international flight or DH6.0 for domestic flight.

Calculated according to the traffic forecast (middle) given in Table 3-4, total annual revenue which comes from airport utilization fee was estimated as shown in Table 9-7.

Table 9-7 ESTIMATED AIRPORT UTILIZATION FEE
OF THE NADOR NEW AIRPORT

(Unit: US\$1,000)

	1989	1990	1995	2000	2005	2010	2015
International	294	315	434	592	804	1,085	1,461
Domestic	20	22	32	45	63	87	121
Total	314	337	466	637	867	1,172	1,582

5) Public Properties Occupation Charge

Occupation of public properties of the airport will be charged on the basis of area occupied and the period of occupation as fixed hereunder:

- Hangar for aircraft : more than DH36.0/m²/year
- Hangar for workshop and garage of vehicles: more than DH48.0/m²/year
- Room space for use of offices and commercial activities inside the terminal building : more than DH300.0/m²/year
- Miscellaneous premises for use of offices, warehouses, quarters and commercial activities outside the terminal building : more than DH60.0/m²/year
- Prepared and paved land space : more than DH12.0/m²/year
- Natural and roughly prepared land space : more than DH6.0/m²/year

Estimation of the expectable revenue of the new airport from public properties occupation charge is made based on the area requirements of respective buildings and facilities as mentioned in Chapter 4, and applying the respective charges twice as much. The estimated annual revenues are shown in Table 9-8.

Table 9-3 ESTIMATED PUBLIC PROPERTIES OCCUPATION CHARGE
OF THE NADOR NEW AIRPORT

Items	(Unit: US\$1,000)						
	1989	1990	1995	2000	2005	2010	2015
<u>Inside the Terminal Building</u>							
Office space	11.2 (150)	11.2 (150)	11.2 (150)	11.2 (150)	11.2 (150)	11.2 (150)	11.2 (150)
Commercial activity space	14.9 (200)	14.9 (200)	14.9 (200)	14.9 (200)	14.9 (200)	14.9 (200)	14.9 (200)
Restaurant space	22.3 (300)	22.3 (300)	22.3 (300)	22.3 (300)	22.3 (300)	22.3 (300)	22.3 (300)
<u>Outside the Terminal Building</u>							
Office space	1.5 (100)	1.5 (100)	1.5 (100)	1.5 (100)	1.5 (100)	1.5 (100)	1.5 (100)
Workshop and garage space	1.5 (130)	1.5 (130)	1.5 (130)	1.5 (130)	1.5 (130)	1.5 (130)	1.5 (130)
Restaurant space	2.4 (160)	2.4 (160)	2.4 (160)	2.4 (160)	2.4 (160)	2.4 (160)	2.4 (160)
<u>Prepared Land</u>							
Car parking area	21.4 (7,200)	21.4 (7,200)	21.4 (7,200)	21.4 (7,200)	21.4 (7,200)	21.4 (7,200)	21.4 (7,200)
Fuel storage area	6.0 (2,000)	6.0 (2,000)	6.0 (2,000)	6.0 (2,000)	6.0 (2,000)	6.0 (2,000)	6.0 (2,000)
Total	81.2	81.2	81.2	81.2	81.2	81.2	81.2

Note : Figures in parentheses indicate the chargeable floor areas.

6) Cargo Fee

A fee fixed at DH0.06 (US\$0.0074) per kilogram of weight will be imposed on the volume of cargo to be handled through the new airport.

Total annual revenues from cargo fee are shown in Table 9-9. These revenues are estimated based on the cargo traffic forecast made in Table 3-9 in Chapter 3.

Table 9-9 ESTIMATED CARGO FEE OF THE NADOR
NEW AIRPORT

(Unit: US\$1,000)

1989	1990	1995	2000	2005	2010	2015
3.0 (407)	3.2 (436)	4.5 (606)	6.2 (834)	8.5 (1,143)	11.6 (1,559)	15.8 (2,116)

Note : Figures in parentheses indicate tonnage of cargo handled in thousand tons.

7) Commercial Activities Charge

All extra-aeronautical businesses within the airport premises, such as restaurant, duty-free shops and other shops, insurance agencies, car rental agencies, etc., are subject to payment of a charge to the public Airport Concessionary Office. This charge is usually equivalent to 15% of business turn-over as retained in this study. On the basis that each passenger would spend DH15 on an average in the new airport upon arrival as well as before departure, the revenue expectable per passenger is around DH2.25 (US\$0.28).

Total revenues from commercial activities charge estimated in accordance with the above-mentioned value and passenger traffic forecast (Table 3-4 in Chapter 3) are figured in Table 9-10.

Table 9-10 ESTIMATED COMMERCIAL ACTIVITIES CHARGE
OF THE NADOR NEW AIRPORT

(Unit: US\$1,000)

1989	1990	1995	2000	2005	2010	2015
60	64	89	123	168	229	311

8) Other Charges and Fees

Revenues from other charges and fees stipulated in the airport tariff system, such as machineries and tools rental charge, aircraft sheltering charge and observation deck entrance fee, are not taken into account in calculating the financial benefits, because these equipment and facilities are not available enough in the new airport.

9.4 FINANCIAL INTERNAL RATE OF RETURN (FIRR)

Based on the cash flow shown in Table 9-11, the obtained FIRR of the Project is 2.1%, which is generally the normal figure in case of a new airport construction project. However, it is expected that through a series of financial measures being considered by Moroccan Government, the feasibility of the project will be more improved.

The results of sensitivity analysis of FIRR are shown hereunder:

Benefit (Tariff)	Project Cost		
	-10%	+0%	-10%
+ 0%	3.9%	2.1%	0.5%
+10%	5.7%	3.8%	2.1%
+20%	7.4%	5.3%	3.6%

Table 9-11 FINANCIAL INTERNAL RATE OF RETURN (FIRR) OF THE NADOR NEW AIRPORT CONSTRUCTION PROJECT

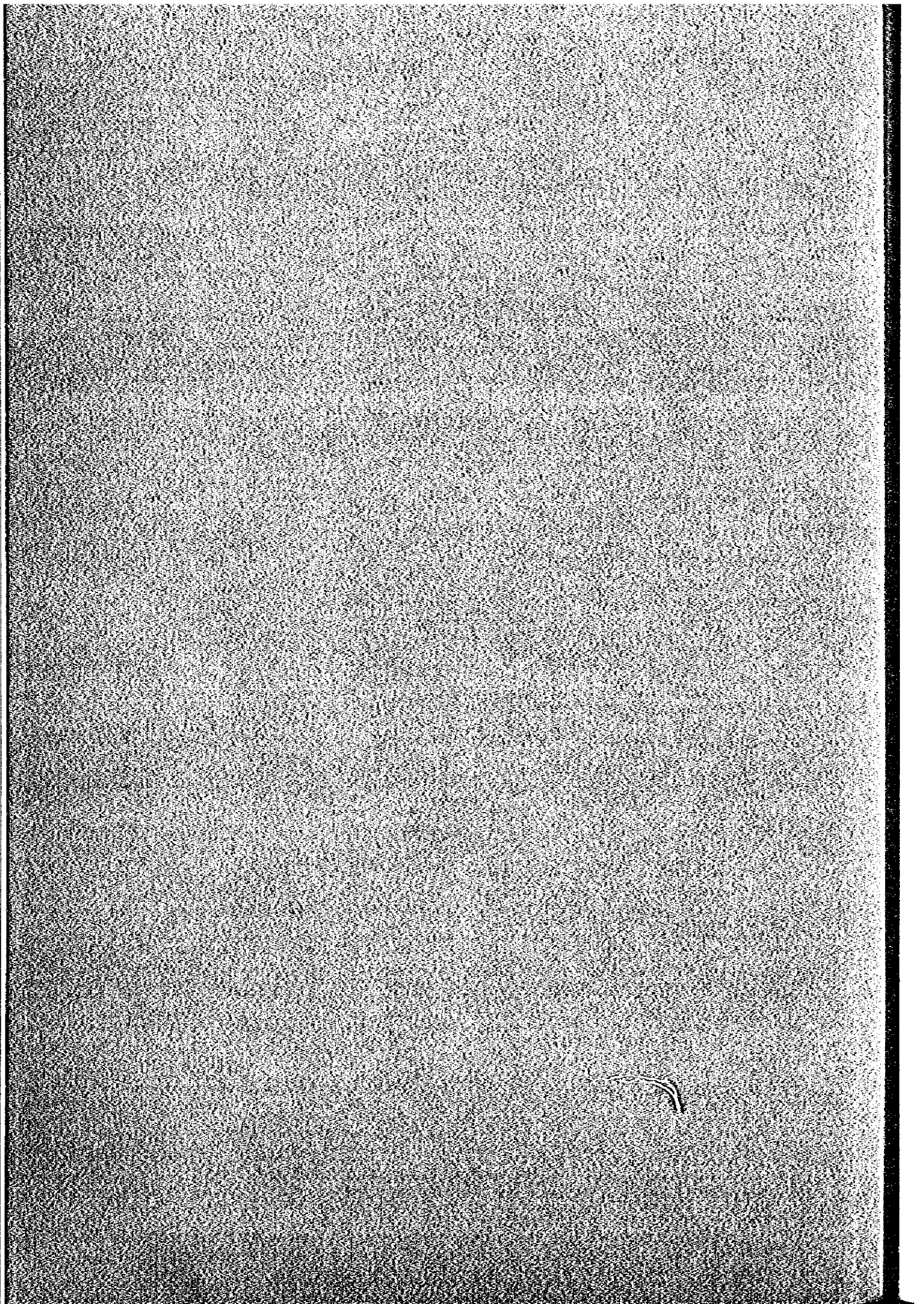
(Unit : US\$1,000)

Year	Costs				Benefits											Total Revenues	Benefit Less Cost										
	Construction Cost	Operation & Maintenance Cost	Land Sale	Total Cost	Lighting Charge	Aircraft Parking Charge	Airport Utilization Fee	Properties Occupation Charge	Cargo Fee	Commercial Activities Charge	1	2	3	4	5			6	7	8	9	10	11	12	13	14	15
1 1986	2,623	0	-18,000	-15,377	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,377
2 1987	10,884	0	0	10,884	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-10,884
3 1988	14,006	0	0	14,006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-14,006
4 1989	0	771	0	771	255	2	314	3	22	2	314	3	81	3	60	737	34	64	788	12	64	788	12	64	788	12	34
5 1990	0	776	0	776	276	3	337	3	24	3	337	3	81	3	64	788	12	64	788	12	64	788	12	64	788	12	12
6 1991	0	782	0	782	294	3	359	3	25	3	359	3	81	3	69	835	53	69	835	53	69	835	53	69	835	53	53
7 1992	0	789	0	789	316	3	383	3	27	3	383	3	81	3	73	887	98	73	887	98	73	887	98	73	887	98	98
8 1993	0	795	0	795	336	3	410	3	29	3	410	3	81	3	78	941	146	78	941	146	78	941	146	78	941	146	146
9 1994	0	804	0	804	360	3	438	3	31	3	438	3	81	3	84	1,001	197	84	1,001	197	84	1,001	197	84	1,001	197	197
10 1995	0	809	0	809	382	4	466	4	33	4	466	4	81	4	89	1,060	251	89	1,060	251	89	1,060	251	89	1,060	251	251
11 1996	0	821	0	821	408	4	496	4	35	4	496	4	81	4	95	1,124	303	95	1,124	303	95	1,124	303	95	1,124	303	303
12 1997	0	826	0	826	434	4	527	4	37	4	527	4	81	4	101	1,189	363	101	1,189	363	101	1,189	363	101	1,189	363	363
13 1998	0	831	0	831	462	4	562	4	40	4	562	4	81	4	108	1,263	432	108	1,263	432	108	1,263	432	108	1,263	432	432
14 1999	3,924	845	0	4,769	493	5	597	5	42	5	597	5	81	5	115	1,339	430	115	1,339	430	115	1,339	430	115	1,339	430	3,430
15 2000	2,722	848	0	3,570	527	5	637	5	45	5	637	5	81	5	123	1,424	586	123	1,424	586	123	1,424	586	123	1,424	586	2,146
16 2001	0	922	0	922	560	5	677	5	48	5	677	5	81	5	130	1,508	662	130	1,508	662	130	1,508	662	130	1,508	662	662
17 2002	0	937	0	937	596	6	719	6	51	6	719	6	81	6	139	1,599	755	139	1,599	755	139	1,599	755	139	1,599	755	755
18 2003	0	941	0	941	634	6	765	6	54	6	765	6	81	6	148	1,696	814	148	1,696	814	148	1,696	814	148	1,696	814	814
19 2004	857	956	0	1,813	675	6	814	6	58	6	814	6	81	6	157	1,799	100	157	1,799	100	157	1,799	100	157	1,799	100	100
20 2005	857	958	0	1,815	721	7	867	7	62	7	867	7	81	7	168	1,915	100	168	1,915	100	168	1,915	100	168	1,915	100	100
21 2006	0	966	0	966	767	7	921	7	66	7	921	7	81	7	179	2,030	1,064	179	2,030	1,064	179	2,030	1,064	179	2,030	1,064	1,064
22 2007	0	970	0	970	816	8	977	8	70	8	977	8	81	8	190	2,152	1,182	190	2,152	1,182	190	2,152	1,182	190	2,152	1,182	1,182
23 2008	0	978	0	978	868	8	1,038	8	74	8	1,038	8	81	8	202	2,281	1,303	202	2,281	1,303	202	2,281	1,303	202	2,281	1,303	1,303
24 2009	0	987	0	987	918	9	1,104	9	79	9	1,104	9	81	9	215	2,417	1,430	215	2,417	1,430	215	2,417	1,430	215	2,417	1,430	1,430
25 2010	0	990	0	990	983	9	1,172	9	84	9	1,172	9	81	9	229	2,570	1,580	229	2,570	1,580	229	2,570	1,580	229	2,570	1,580	1,580
26 2011	0	1,006	0	1,006	1,044	10	1,245	10	90	10	1,245	10	81	10	243	2,725	1,719	243	2,725	1,719	243	2,725	1,719	243	2,725	1,719	1,719
27 2012	0	1,008	0	1,008	1,111	10	1,322	10	95	10	1,322	10	81	10	259	2,891	1,883	259	2,891	1,883	259	2,891	1,883	259	2,891	1,883	1,883
28 2013	0	1,014	0	1,014	1,180	11	1,403	11	101	11	1,403	11	81	11	275	3,065	2,051	275	3,065	2,051	275	3,065	2,051	275	3,065	2,051	2,051
29 2014	0	1,016	0	1,016	1,255	12	1,490	12	108	12	1,490	12	81	12	292	3,253	2,237	292	3,253	2,237	292	3,253	2,237	292	3,253	2,237	2,237
30 2015	0	1,017	0	1,017	1,334	13	1,582	13	115	13	1,582	13	81	13	311	3,452	2,435	311	3,452	2,435	311	3,452	2,435	311	3,452	2,435	2,435
Total	35,873	24,363	-18,000	42,236	18,005	170	21,622	170	1,545	170	21,622	170	2,187	216	4,196	47,941	5,705	4,196	47,941	5,705	4,196	47,941	5,705	4,196	47,941	5,705	5,705

FIRR = 2.1%

CHAPTER 10

ECONOMIC EVALUATION



CHAPTER 10

ECONOMIC EVALUATION

10.1 GENERAL

In this Chapter, the economic evaluation of the Nador New Airport Project was made from the point of view of the whole national economy to confirm the economic viability of the Project through computation of economic internal rate of return (EIRR).

Economic cost was calculated based on the financial cost mentioned in Section 9.2. Economic benefit was estimated by comparing the "with Project" and "without Project" conditions.

Evaluation period was set at 30 years as same as in the case of financial analysis.

10.2 CONSIDERATION OF 'WITHOUT PROJECT' CONDITION

10.2.1 Basic "Without Project" Condition

In order to estimate the economic benefit, "without Project" condition was assumed. In this condition, no new airport was assumed to be constructed and the existing Oujda-Angads Airport was assumed to function as it does without any investments realized during the period under consideration, i.e. 30 years. In this assumption, Oujda-Angads Airport will reach a stage where its handling capacity in both the passenger and the cargo traffics will attain its saturation point. After that stage, the airport will not be able physically to handle the future traffic forecasted in Chapter 3.

10.2.2 Physical Limitation of Oujda-Angads Airport

The physical limitation of the present Oujda-Angads Airport is anticipated in the following aspects.

1) Passenger Terminal Building

The passenger handling capacity of the present terminal building is 328,000 persons as shown in Fig. 10-1. In the year 1991, this handling capacity will be overflowed by the number of passengers using the terminal.

2) Passenger Loading Apron

The present apron measures 115 x 200 m and is able to accommodate simultaneously two B-727 type and one B-737 type aircraft. On the other hand, the number of annual aircraft movements was forecasted as shown in Table 9-3. According to this projection, the number of passengers likely to use the airport will exceed its capacity (746,000 persons) after the year 2004 as shown in Fig. 10-2.

10.2.3 Saturation Point of Oujda-Angads Airport

According to the estimation made in the preceding Section, Oujda-Angads Airport was assumed to reach its saturation point in 1991 when its passenger handling capacity will be overflowed. The Table 10-1 shows the forecast of the number of incoming and departing passengers in the "without Project" condition.

**FIG. 10-1 OVERFLOWING TRAFFIC AT OUJDA-ANGADS AIRPORT
IN CASE OF WITHOUT NADOR NEW AIRPORT
(Passenger Terminal Building)**

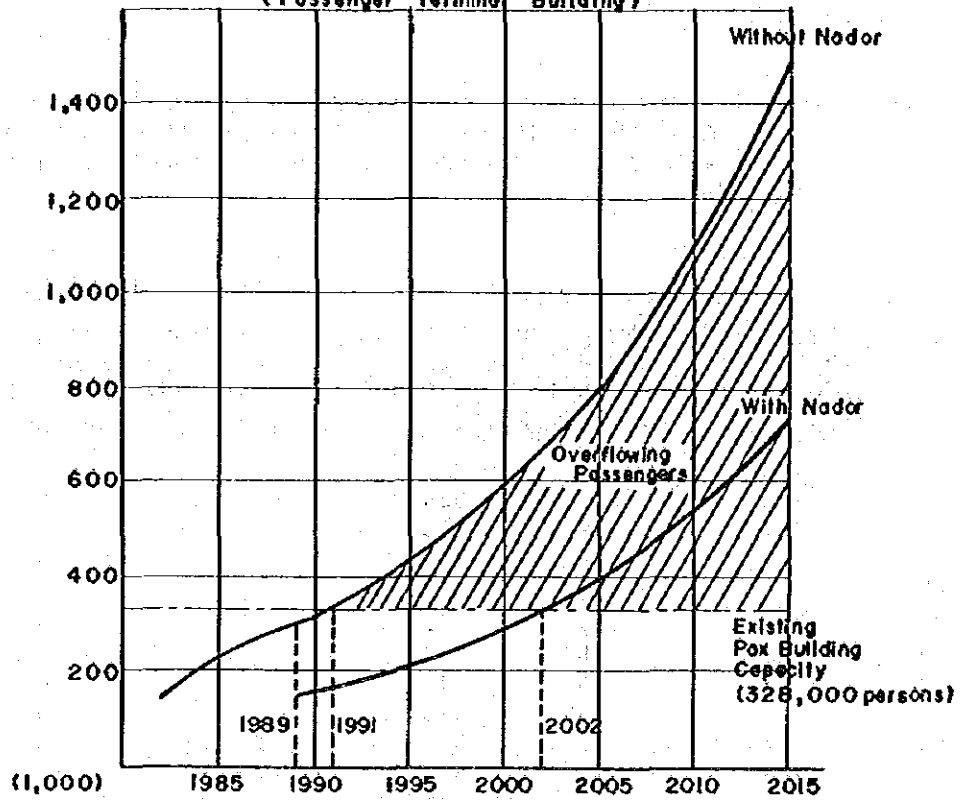


Fig. 10-1 OVERFLOWING TRAFFIC AT OUJDA-ANGADS AIRPORT IN CASE OF WITHOUT NADOR NEW AIRPORT (PASSENGER TERMINAL BUILDING)

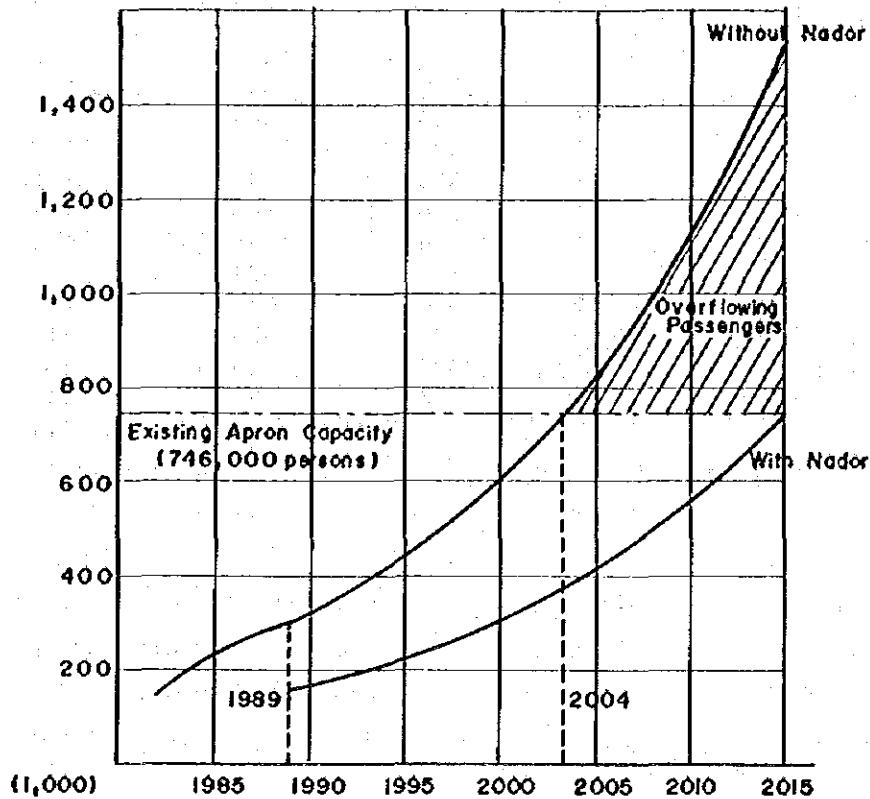


Fig. 10-2 OVERFLOWING TRAFFIC AT OUJDA-ANGADS AIRPORT IN CASE OF WITHOUT NADOR NEW AIRPORT (PASSENGER LOADING APRON)

Table 10-1 FORECAST OF WITHOUT NADOR NEW AIRPORT CASE DEMAND AND OVERFLOWING PASSENGER TRAFFIC ACCOMMODATED AT THE NADOR NEW AIRPORT (Passenger Terminal Building)

(Unit: 1,000 persons)

Year	Without Nador New Airport Case Passenger Traffic Capacity			Overflowing Passengers Handled at the Nador New Airport		
	International Passengers	Domestic Passengers	Total	International Passengers	Domestic Passengers	Total
	1983	262	66	328	0	0
1984	262	66	328	0	0	0
1985	262	66	328	0	0	0
1986	262	66	328	0	0	0
1987	262	66	328	0	0	0
1988	262	66	328	0	0	0
1989	262	66	328	0	0	0
1990	262	66	328	0	0	0
1991	262	66	328	7	0	7
1992	262	66	328	25	5	30
1993	262	66	328	43	11	54
1994	262	66	328	62	17	79
1995	262	66	328	83	24	107
1996	262	66	328	105	31	136
1997	262	66	328	128	39	167
1998	262	66	328	153	47	200
1999	262	66	328	179	56	235
2000	262	66	328	205	66	271
2001	262	66	328	234	76	310
2002	262	66	328	265	86	351
2003	262	66	328	298	97	395
2004	262	66	328	333	109	442
2005	262	66	328	369	122	491
2006	262	66	328	407	136	543
2007	262	66	328	447	151	598
2008	262	66	328	490	167	657
2009	262	66	328	536	184	720
2010	262	66	328	584	202	786
2011	262	66	328	635	221	856
2012	262	66	328	688	242	930
2013	262	66	328	745	264	1,009
2014	262	66	328	805	288	1,093
2015	262	66	328	869	313	1,182

10.3 ECONOMIC COST ESTIMATION

10.3.1 Basic Concept

Both the construction cost including expansion and replacement cost and the operation and maintenance (O&M) cost of the Project shown in Chapter 8 were estimated by financial cost based on a prevailing market price. In the economic evaluation, were excluded all taxes - direct and indirect - custom duties, as well as price escalation that may occur during the construction period.

10.3.2 Economic Construction Cost

The economic construction cost including expansion and replacement cost was estimated by the following procedures, principally by diverting from the financial construction cost shown in Chapter 8.

- a. Imported items used in the construction as well as services and charges for special skilled labour were first estimated in Japanese Yen and converted to U.S. Dollar. For those items available in Morocco such as construction materials, services, labour both skilled and unskilled, they were first estimated in local currency and converted to U.S. Dollar.
- b. Import duties were excluded in view of public character of this project.
- c. For locally available materials and services, the transfer payment items such as taxes - both direct and indirect - subsidies, etc. estimated at 10% on an average, were deducted from the financial costs.
- d. Because of the underemployment situation in Morocco, the regulated minimum wage was adopted to evaluate the salary of unskilled labour. The daily minimum wage is estimated at DH40 or about US\$5.

e. In view of the strict exchange control regulation in Morocco, the foreign exchange rate was fixed at the existing official rate applicable to the whole country. This means that no difference between official rate and current rate was considered. The exchange rate used in this Study is the rate prevailing in January 1984, that is US\$1 = DH8.06 = ¥235.

The economic construction costs thus obtained are indicated in Table 10-2.

Table 10-2 ESTIMATED CONSTRUCTION COST IN ECONOMIC COST CALCULATION

(At 1984 Price, Unit: US\$1,000)

Item	Foreign Portion	Local Portion	Grand Total
1. Civil Works	1,659	865	2,524
2. Pavement	3,459	1,806	5,265
3. Building	3,196	959	4,155
4. Utilities	1,894	920	2,814
5. Lighting & Radio Nav aids	3,944	329	4,273
Sub-total	14,152	4,879	19,031
6. Engineering	1,415	488	1,903
7. Compensation	0	268	268
8. Physical Contingency	1,558	564	2,122
Grand-total	(17,125)	(6,199)	23,324

10.3.3 Operation and Maintenance Cost

The economic O&M cost of the proposed Project was calculated based on the economic construction cost following the same procedures as mentioned in Section 9.2. The result is shown in Table 10-3.

Table 10-3 ESTIMATED ECONOMIC COST OF OPERATION AND MAINTENANCE OF THE NADOR NEW AIRPORT

(At 1984 Price, Unit: US\$1,000)

Year	Operation and Maintenance			Sub-Total	Wages	Others	Total
	Civil Works	Buildings & Utilities	Navigation Aids & Other Equipment				
1989	71	84	259	414	263	34	711
1990	71	84	259	414	268	34	716
1991	71	84	259	414	274	34	722
1992	71	84	259	414	280	35	729
1993	71	84	259	414	286	35	735
1994	71	84	259	414	295	35	744
1995	71	84	259	414	299	36	749
1996	71	84	259	414	311	36	761
1997	71	84	259	414	316	37	767
1998	71	84	259	414	320	37	771
1999	71	84	259	414	334	37	785
2000	71	84	259	414	337	38	789
2001	73	117	259	449	341	40	830
2002	73	117	259	449	355	40	844
2003	73	117	259	449	359	40	848
2004	73	117	259	449	373	41	863
2005	73	117	259	449	375	41	865
2006	73	117	259	449	383	42	874
2007	73	117	259	449	387	42	878
2008	73	117	259	449	394	42	885
2009	73	117	259	449	403	43	895
2010	73	117	259	449	406	43	898
2011	73	117	259	449	421	44	914
2012	73	117	259	449	423	44	916
2013	73	117	259	449	429	44	922
2014	73	117	259	449	431	44	924
2015	73	117	259	449	432	44	925

10.4 ECONOMIC BENEFITS ESTIMATION

10.4.1 Basic Concept

The economic benefits derived from the Nador New Airport were calculated on the basis of the comparison between "with Project" and "without Project" cases for the target year 2000. The new airport is expected to provide a wide range of benefits, both direct and indirect, some of which are hard to quantify. In this study, only the direct tangible benefits were taken up as the Project's benefit following the usual way of project evaluation by international financing organizations.

10.4.2 Direct Benefits

1) Tangible Benefits

a. Meeting Passengers Demand

As explained in Section 10.2, Oujda-Angads Airport will reach its saturation point in 1991 in the "without Project" case. In such event, excess passengers will have to use either Al Hoceima or Fès-Saiss Airports or cancel their trips. In this study, such overflowing passengers who diverted to alternative airport were assumed to represent 50% of the overflowing passengers and those who cancelled their air trip were assumed to represent another 50%.

Only resident passengers were counted in computation of the Project's benefit.

(1) Benefits of Overflowing Passengers Compelled to Use Alternative Airports

For travellers unable to use Oujda-Angads Airport because of its limited capacity, they will be compelled to go either to Al Hoceima or Fès-Saiss by motoring to the respective airports. In this calculation, it was assumed that 70% of the passengers will use Al Hoceima airport while the remaining 30% will go to Fès-Saiss. In the analysis, benefits deriving from time and cost savings between Nador-Oujda and Nador-Al Hoceima & Nador-Fès were taken into account. The calculation was made by the following equation:

$$B_i = (V_i T_r + C_r) N_i$$

where

B_i = Benefits in time and cost savings in the year i

V_i = Time value of resident passenger in the year i

T_r = Averaged travel time between Nador-Oujda and Nador-Al Hoceima & Nador-Fès

C_r = Averaged travel cost between Nador-Oujda, Nador-Al Hoceima and Nador-Fès

N_i = Total number of air passengers in the year i

It was assumed that a weighted average travel time saved between Nador-Oujda and Nador-Al Hoceima & Nador-Fès is 1.6 hour by bus and that a weighted average travel cost saved by bus between the above distance is US\$1.

The time value of the resident passengers was calculated as follows: According to World Bank statistics, the per capita value added of Moroccan workers in the industrial and service sectors was US\$2,975 at market prices in 1980. Assuming an increase rate of the GDP of 13.6% per year, the per capita value added will reach US\$4,954 in 1984. With the annual working hours assumed at 2,000, the time value added per worker in the industrial and service sectors in 1984 was estimated at US\$2.5 per hour.

Moreover, those passengers using air facilities in Morocco were assumed to be mostly businessmen belonging to the middle or upper class of the society and their time value was calculated at US\$5/h or two times higher compared to the time value added of the average workers. On the other hand, the time value of tourists was assumed at a half of the businessmen's or US\$2.5.

According to the forecast made by the Paris Airport Authority, air passengers using the Oujda-Angads airport are 35% for business, 65% for tourism and other purposes. Based on these figures, the average time value of a passenger was calculated at US\$3.4. The time value of air passengers is expected to increase in line with the increase in GDP. In this study, an increase rate of 4.5% per year as same as the real GDP growth rate was applied. The estimated time value added is shown in Table 10-4.

Table 10-4 ESTIMATE OF TIME VALUE ADDED OF RESIDENT AIR PASSENGER

Year	US\$/hr.
1984	3.4
1985	3.5
1990	4.4
1995	5.5
2000	6.8
2005	8.5
2010	10.6
2015	13.3

(2) Benefits of Meeting Potential Demands

After the time of the saturation of the Oujda-Angads Airport, 50% of the total overflowing passengers were assumed to be forced to cancel their air trip. When the new airport is constructed, the cancelled passengers can continue their air trips, which may be useful and give satisfaction to them.

In this study, these advantages have been estimated in minimum by the value of air fare which the passengers who cancel their trips are "willing to pay". These advantages may have in reality a value higher than the estimated one which is counted as economic benefit of the Project.

Assuming that the current air fares for different routes shown in Table 10-5 remain the same at the time of the saturation of Oujda-Angads Airport, and that the share of each route shown in Chapter 3 is proportionally similar, the weighted average air fares were calculated at US\$195 for international flights and US\$36 for domestic flights. It was also assumed that the ratio between resident passengers and non-resident passengers remains 1:1 as it is now for international flights while the ratio of 9:1 was applied for domestic service.

Table 10-5 CURRENT INTERNATIONAL & DOMESTIC
AIR FARES BY ROUTES

(Unit: US\$)

Route	Fare
<u>International Route</u>	
Oujda - Marseille	142
Oujda - Frankfurt	226
Oujda - Lyon	204
Oujda - Amsterdam	231
Oujda - Brussels	225
Oujda - Paris	204
<u>Domestic Route</u>	
Oujda - Fès-Saiss	21
Oujda - Casablanca	36
Oujda - Marrakech	50
Oujda - Agadir	65
Oujda - Laayoune	101

Source: Direction des Bases Aériennes (As of January 1984)

For the purpose of calculation, the benefits enjoyed by resident passengers only were taken into account. The results are shown in Table 10-6.

Table 10-6 ESTIMATE OF BENEFITS OF SATISFIED TRIP DEMAND OF OVERFLOWING PASSENGERS

(At 1984 Price, Unit: US\$1,000)

Year	Time & Cost saved on road transport to alternative airport	Benefits of passengers who are considered to be potential users of the New Airport			Total
		International	Domestic	Sub-total	
1989	0	0	0	0	0
1990	0	0	0	0	0
1995	309	4,046	389	4,435	4,744
2000	963	9,994	1,069	11,063	12,026
2005	2,149	17,989	1,976	19,965	22,114
2010	4,264	28,470	3,272	31,742	36,006
2015	7,986	42,364	5,071	47,435	55,421

b. Benefits Derived from Savings of Access Time and Cost

With the new airport, the distance from Nador City to the terminal will be 26 km compared to about 135 km to Oujda-Angads Airport. For travellers using the new airport, it means a saving in time and cost. The calculation of the benefits resulting from shorter distance to the new airport was made by applying the same equation as described in Sub-section 10.4.2, that is:

$$B_i = (V_i Tr + Cr) N_i$$

where

B_i = Benefits by time and cost savings in year i

V_i = Time value of resident passenger in year i

Tr = Weighted average of time value saved by bus or taxi travel

Cr = Weighted average of cost value saved by bus or taxi travel

N_i = Total number of air passengers in year i

Basic data referred to in calculating the saved access time and cost are given in Table 10-7.

Table 10-7 BASIC DATA FOR CALCULATION OF SAVED ACCESS TIME & COST

Traffic Category	Time Value	Transport Mode	Share (%)	Weighted Time and Cost Saved with the New Airport /2	
				Time /3 (min.)	Cost /4 (US\$)
Resident Passenger (In Nador Province and its influenced area)	/1	Taxi	30	85 (1.4hr)	2.4
		Bus	70	100 (1.67hr)	1.1

Notes: /1 For the time value of resident passengers, refer to Table 10-4.

/2 Weighted saved time & cost were calculated on the basis of population distribution in the Nador Province and its influenced area.

/3 Time was calculated on the assumption that the speed of taxi and bus is 60 km and 50 km per hour, respectively.

/4 Bus and taxi fares are based on the existing tariff structure.

The results of the calculation are shown in Table 10-8.

Table 10-8 BENEFITS OF ACCESS TIME AND COST SAVED

(Unit: US\$1,000)

Year	Resident Passengers		Total
	International	Domestic	
1989	597	1,076	1,673
1990	665	1,196	1,861
1995	839	1,511	2,350
2000	1,011	1,819	2,830
2005	1,230	2,214	3,444
2010	1,502	2,704	4,206
2015	1,854	3,337	5,191

c. Income from Increased Foreign Tourists

The difference in passenger forecasts between the "without Project" case and the "with Project" case constitutes the increased demand for air trip generated by the construction of the new airport. This incremental demand for air trip after the completion of the new airport was anticipated to arise from the on-going industrial development in the suburbs of Nador city, the probable transfer of passengers from the existing Melilla Airport and the increase in number of international tourists passing through the Nador New Airport.

In this Study, the total increment of passengers to be generated by the construction of new airport was estimated at 30% of that for "without Project" case. Of this 30%, one sixth or 5% was assumed to constitute the international (non-resident) tourists and only arrival passengers were counted in this benefit computation.

Statistics in the past 4 years (1978 - 1982) show that foreign tourists have spent an average of US\$210 (at market prices) per person during their stay in Morocco as shown in Table 10-9. Moreover, in an inquiry survey covering the 1978-1980 period, it was found that the average stay in Morocco of tourists was about 10 days. It is anticipated that with the amelioration of tourism infrastructures, the average stay of international tourists will be lengthened and that each tourist will be spending more. In this Study, it was anticipated that an annual net increase of 2.5% in tourists' expenditure will occur through the year 2015.

Table 10-9 VALUE CONSUMED PER TOURIST

	Number of ^{/*} Non-Resident Visitors (thousand persons)	Total Tourism Income (million US\$)	Value consumed Per Tourist (US\$)
1978	1,546	330	213
1979	1,549	340	219
1980	1,517	324	214
1981	1,646	354	215
1982	1,903	369	194

Remark: ^{/*} Including about 350,000 (per year) Moroccans working abroad.

Source: Plan de Développement Economique et Social 1981 - 1985, Volume II and Statistics of Ministry of Tourism

In this Study, the value added ratio of all Moroccan industry, inclusive of tourism, was assumed at 50% on an average. Upon this assumption, calculation was made on the tourism net revenue increase brought by the arrival of non-resident passengers at the new airport. The results are shown in Table 10-10.

Table 10-10 ESTIMATE OF NET INCREASE IN TOURISM INCOME

Year	Number of Increased Arriving Non-Resident Passengers (A)	Value Consumed Per Passenger (US\$) (B)	Net Increase in Tourism Income (US\$1,000) (AB/2)
1989	2,000	250	250
1990	2,100	256	269
1995	2,900	289	419
2000	4,000	328	656
2005	5,400	371	1,002
2010	7,300	419	1,529
2015	9,800	474	2,323

2) Direct Intangible Benefits

a. Flight Safety

Owing to its proximity to the Algerian border, Oujda-Angads Airport is faced with the problem of flight safety as Algeria has set a restricted air space within its own border. When put into service, the new airport will enhance the safety of flights in the area. Such aspect is one of the benefits of the Project though it cannot be quantified.

b. Comfort and Convenience

With all the modern amenities to be introduced into the new airport, it will provide the passengers with much improved services and added comfort. Contrary to the confusion existing at Oujda-Angads Airport, the terminal at the new airport will be designed to provide prompt checking service, efficient handling of customs clearance and immigration formalities, thus minimizing the waiting time for incoming and departing passengers. Such conveniences constitute added direct benefits to the airport users. However, it is not possible to quantify such benefits.

10.4.3 Indirect Benefits

a. Employment Opportunities

The Nador New Airport Project will provide job opportunities to workers during the construction period. When it will be put into use, more jobs will be made available for the operation, maintenance and administration of the new airport. In this context, the new airport will help to increase people's incomes. These benefits are usually treated as indirect benefits and are not included in the calculation of the economic evaluation.

b. Multiplier Economic Effects

The benefits derived from the multiplier effects of the new airport will be spread to the regional economy during and after the construction stage. They will derive from increased incomes provided by job opportunities and the procurement of construction materials and the like. Moreover, new business will be created with the anticipated influx of tourists.

More concretely, the following multiplier economic effects are expected to be brought about along with the realization of the new airport:

Firstly, in the agricultural sector, the Project will promote the production of fresh products exportable to Europe, such as citrus fruits, vegetables, flower, etc. It will also induce the development of livestock, namely the breeding of chicks and pets for export.

Secondly, in the industrial and manufacturing sectors, with the creation of a new airport, the diversification of industrial and manufacturing activities in its influenced area can be initiated. At the present, the prevailing industries in Nador Province are confined to those which use local natural resources as raw materials, such as iron, phosphate, petroleum energy-related industries. In the future, larger industrial zones including also food processing, garment and machinery manufacture, etc., may be created when convenient air transport facility is made available.

Thirdly, also as an impact of the airport construction, airport-related activities, particularly in the fields of transport, exported and imported goods handling and other business and services as well may be promoted.

As seen above, with the opening of the Nador New Airport it will be possible to stimulate development in various sectors and, as a result, more employment opportunities will be created, employment structure diversified and urbanization accelerated.

As a result, with the development of service activities, especially in urban industries, high speed traffic demand will increase and, accordingly, air transport demand is expected to proportionally increase too.

The multiplier economic effects are, however, considered as indirect benefits and are not quantified in the economic evaluation.

c. Socio Economic Impact

Contrary to the Oujda-Angads Airport which is remote from the coastal area, the Nador New Airport will be located relatively near Nador City. Nador City is being promoted to become the nucleus for the socio-economic development of the Oriental Region. In this context, the new airport will help to enhance the expected development.

d. Information and Cultural Promotion

With the Nador New Airport, direct links will be provided with the Metropolitan Area, with Europe and other cities along the Atlantic coastal areas. Such links will help to promote more information and cultural exchanges between the Oriental Region and other parts of the world and also within Morocco.

10.5 ECONOMIC INTERNAL RATE OF RETURN (EIRR)

The analysis of economic costs shown in Section 10.3 and the economic benefits derived from the direct tangible economic benefits shown in Section 10.4 resulted in an economic internal rate of return (EIRR) of 22.2% as shown in Table 10-11. Since the opportunity cost of capital in the developing countries is generally 10 to 12%, it can be said that the Nador New Airport Project is economically viable from the view point of its national economy. Moreover, if direct intangible and indirect benefits are taken into account, the economic aspects of the Project will be further enhanced in the context of the Moroccan national economy.

Some of the major items of the the economic costs and the tangible direct benefits were adjusted for fluctuation to realize a sensitivity analysis on the value of the EIRR. The results are shown in Fig. 10-3 and below:

<u>Benefit in case of</u>	<u>Project Cost</u>		
	<u>-10%</u>	<u>+0%</u>	<u>+10%</u>
High traffic forecast	27.1%	25.7%	24.4%
Middle traffic forecast	23.4%	22.2%	21.1%
Low traffic forecast	20.1%	19.0%	18.0%

Table 10-11 ECONOMIC INTERNAL RATE OF RETURN (EIRR) OF
THE NADOR NEW AIRPORT CONSTRUCTION PROJECT

(At 1984 Price, Unit: US\$1,000)

No. Year	Costs			Benefits			Benefit Less Cost	
	Construc- tion Cost	Operation & Mainten- ance Cost	Total Cost	Accom- modated Overflowing Passengers	Access Time & Cost Saved	Net Increase in Tourism Income		Total Benefits
1 1986	2,128	0	2,128	0	0	0	0	-2,128
2 1987	9,325	0	9,325	0	0	0	0	-9,325
3 1988	11,871	0	11,871	0	0	0	0	-11,871
4 1989	0	711	711	0	1,673	250	1,923	1,212
5 1990	0	716	716	0	1,861	269	2,130	1,414
6 1991	0	722	722	356	2,020	301	2,677	1,955
7 1992	0	729	729	1,374	2,089	323	3,786	3,057
8 1993	0	735	735	2,416	2,174	359	4,949	4,214
9 1994	0	744	744	3,513	2,245	381	6,139	5,395
10 1995	0	749	749	4,744	2,350	419	7,513	6,764
11 1996	0	761	761	6,027	2,420	460	8,907	8,146
12 1997	0	767	767	7,397	2,528	502	10,427	9,660
13 1998	0	771	771	8,868	2,613	546	12,027	11,256
14 1999	2,087	785	2,872	10,430	2,721	592	13,743	10,871
15 2000	1,389	789	2,178	12,026	2,830	656	15,512	13,334
16 2001	0	830	830	13,788	2,937	706	17,431	16,601
17 2002	0	844	844	15,676	3,074	774	19,524	18,680
18 2003	0	848	848	17,694	3,182	847	21,723	20,875
19 2004	776	863	1,639	19,853	3,290	923	24,066	22,427
20 2005	776	865	1,641	22,114	3,444	1,002	26,560	24,919
21 2006	0	874	874	24,521	3,598	1,083	29,202	28,328
22 2007	0	878	878	27,094	3,729	1,186	32,009	31,131
23 2008	0	885	885	29,854	3,882	1,297	35,033	34,148
24 2009	0	895	895	32,861	4,059	1,411	38,331	37,436
25 2010	0	898	898	36,006	4,206	1,529	41,741	40,843
26 2011	0	914	914	39,391	4,383	1,656	45,430	44,516
27 2012	0	916	916	42,965	4,577	1,804	49,346	48,430
28 2013	0	922	922	46,820	4,754	1,966	53,540	52,618
29 2014	0	924	924	50,957	4,975	2,153	58,085	57,161
30 2015	0	925	925	55,421	5,191	2,323	62,935	62,010
Total	28,352	22,260	50,612	532,166	86,805	25,718	644,689	594,077

EIRR = 22.2%

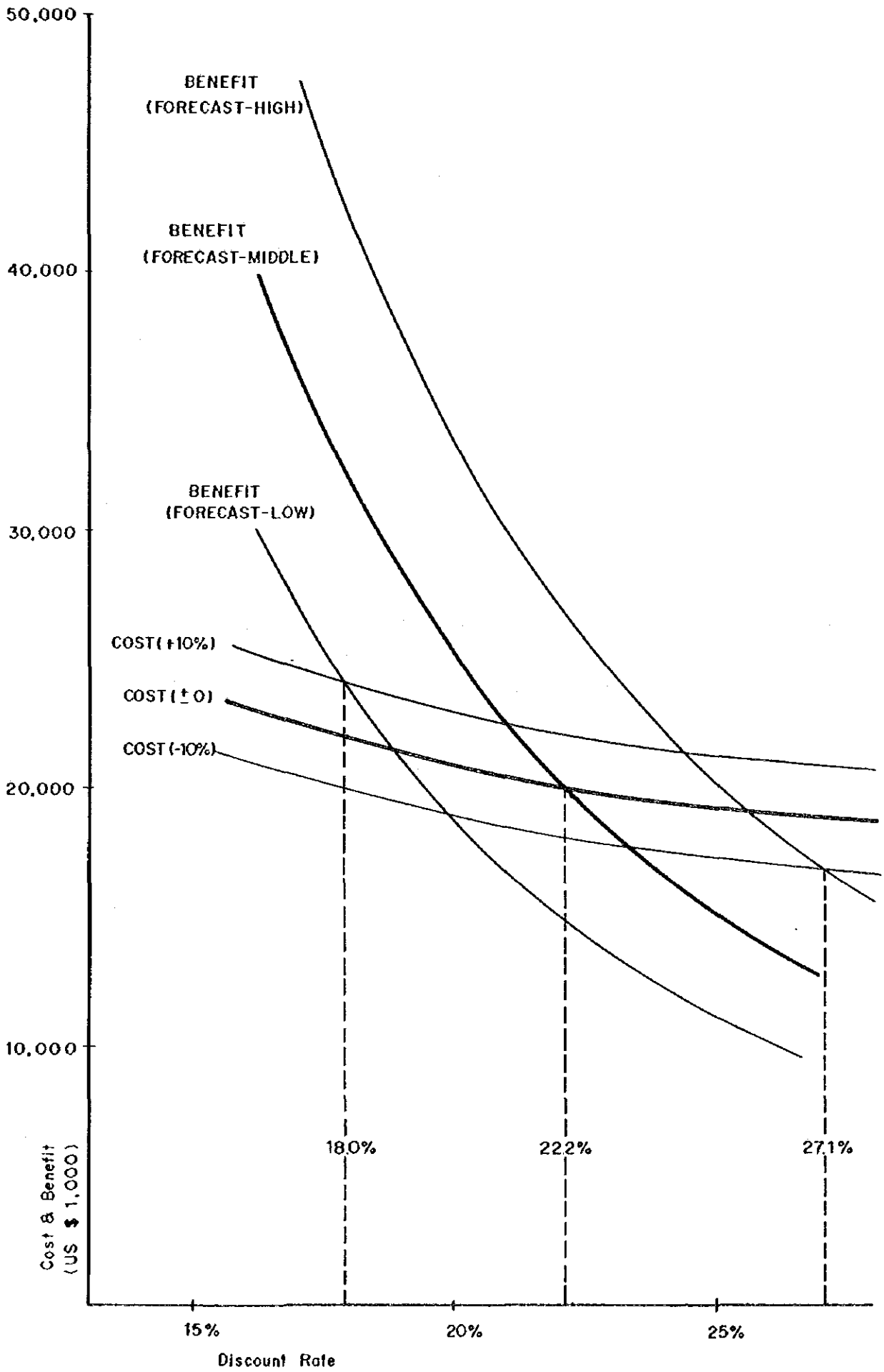


Fig. 10-3 SENSITIVITY TESTS OF EIRR