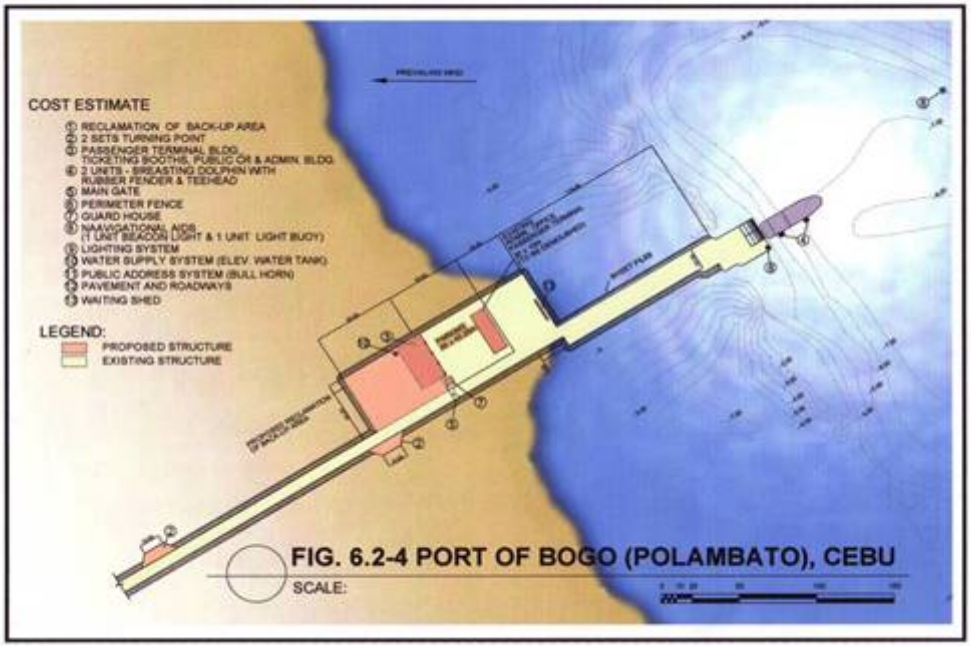
Figure 11.4.11. Development Plan of Port of Bogo Polambato



11.4.6 Balud, Calumpang, Masbate Port

Balud (Calumpang) Port was constructed by DOTC in 2000. The port facilities were subsequently expanded by LGU-Province in 2001 utilizing funds from DOTC under a Memorandum of Agreement with the said agency. The port is currently operational. However, the collection system of port fees and charges has not been established yet by the LGU. At present, the existing port conditions and requirements are shown in Table 11.4.4 and Figure 11.4.1S.

Based on the identified problems and issues of Balud, Calumpang Port, the Development plan is proposed as illustrated in Figure 11.4.13.

Table 11.4.4. Balud, Calumpang Port Existing Conditions and Requirements

RoRo Ramp and Open Pier	Port has one set of RoRo ramp/good condition; 50m open pier in good condition;
Dredging	Existing depth at end of RoRo ramp is (-) 2.5 m; Port needs dredging
Reclamation; Slope protection and stair landing	Existing reclamation area is 50m X 46m; 25% of reclamation area is damaged – needs removal/repair; Port needs additional back-up area and widening of 50m access road to highway
Buildings	No building facilities
Utility	No potable water supply, lighting and public address system;
Perimeter Fence and Gate	No fence and main gate needed to comply with port security requirements
Navigational Aids	No Navigational Aids
Breasting Dolphins	2 units BD with rubber fender and tee heads needed for proper mooring of vessels
Road Access	21-km access road to Balud Poblacion, unpaved; 20-km access road to Masbate City unpaved – needs upgrade

Figure 11.4.12. Photos of Balud Calumpang Port


Damaged portion of reclamation area


Existing Reclamation Area (50m x 46m)

Additional Back-up Area


50 m Open Pier

Paved Portion of Access Road


Paved 50 lin.m. access road from the highway to the Port

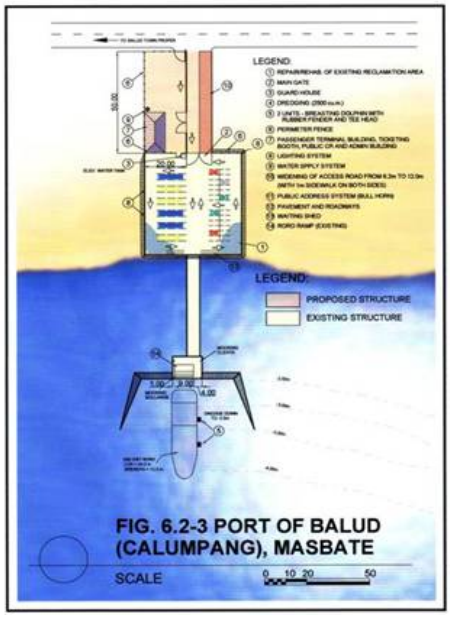
RoRo Ramp at the End of Pier


Unpaved portion of access road to Balud Port

Unpaved portion of access road to Balud Port

Port has no existing fence and main gate

Figure 11.4.13. Development Plan of Balud Calumpang Port



11.4.7 Scope of Works and Investment Requirements for RoRo Port Development

Based on the proposed development plans, the scope of works are determined as shown in Table 11.4.5. Based on this, the direct and total project costs are estimated as shown in Table 11.4.6 and Table 11.4.7.

Table 11.4.5. Proposed Scope of Works

PORT	RoRo Ramp & Open Pier	Dredging	Reclamation	Buildings	Utilities	Perimeter Fence & Gate	Nav. Aids, Breasting Dolphins
Pilar	RoRo Ramp: 12m X 12 m Open Pier: 150 lin m	(-)3.5 m 1600m^3	-	Ticket booth: 165m^2 Rehab PTB 286 m^2 Guard House: 5.07m^2	Water Supply, Lighting and Public Address System	Perimeter Fence: 1220 lin meter Main Gate	Light Beacon
Cataingan	RoRo Ramp: 12m X 12 m Open Pier: 11m x 20m	-	Back-up Area for VPA: 1462m^2 Back-up Area for Banca Users: 3069m^2 Stairlandings	Guard House: 5.07m^2 Waiting Shed: 11.25m^2	Water Supply, Lighting and Public Address System	Perimeter Fence: 30 lin meter Main Gate	Relocation of light beacon from Reclamation Area to end of pier extension
Bogo (Polambato)	-	-	Back-up Area : 2000m^2 Turning Fts: 2 sets	PTB: 558 m^2 Guard House: 5.07m^2 Waiting Shed: 11.25m^2	Water Supply, Lighting and Public Address System	Perimeter Fence: 46 lin meter Main Gate	Light Beacon, Light Buoy & 2 units B. Dolphins
Balud	-	(-)3.5 m 1600m^3	Widening of Access Road; Repair of Damaged reclamation Area; Reclamation of Back-up Area	PTB: 558 m^2 Guard House: 5.07m^2 Waiting Shed: 11.25m^2	Water Supply, Lighting and Public Address System	Perimeter Fence: 65 lin meter Main Gate	2 units B. Dolphins

Table 11.4.6. Breakdown of Estimated Direct Cost for the RRTS Project

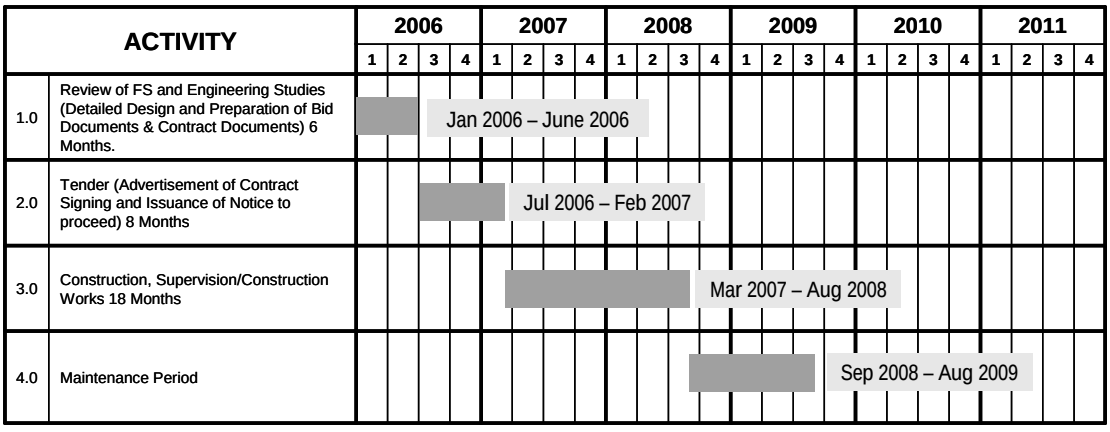
Port	RoRo Ramp & Open Pier	Dredging	Reclamation	Buildings	Utilities	Perimeter Fence & Gate	Nav. Aids, B. Dolphins	Mobilization/ Demobilization	Total
Pilar	33,350,677	528,000		2,878,519	1,015,000	587,000	560,000	1,945,960	40,865,156
Cataingan	14,459,826		9,234,105	2,076,750	1,195,000	265,000	560,000	1,424,538	29,215,219
Bogo			5,064,979	8,466,730	1,330,000	282,890	2,854,740	899,967	18,899,306
Balud		825,000	3,544,077	8,466,730	1,060,000	417,400	1,811,740	388,497	16,513,444
TOTAL	47,810,503	1,353,000	17,843,161	21,888,729	4,600,000	1,552,290	5,786,480	4,658,962	105,493,125

Table 11.4.7. Summary of Total Project Cost for RRTS Pilot Project

Breakdown of Expenditures	% of Total	Total Amount (Php)	Pilar Port Sorsogon	Cataingan Port Masbate	Bogo Port Cebu	Balud Port Masbate
Civil Works	84.79					
Estimated Direct Cost (EDC)		105,493,125	40,865,156	29,215,219	18,899,306	16,513,444
Overhead, Contingencies & Misc.						
OCM (10% of EDC)		10,549,312	4,086,516	2,921,522	1,889,931	1,651,344
Contractor's Profit (12% of EDC)		12,659,175	4,903,819	3,505,826	2,267,917	1,981,613
Total for Civil Works (CW)		128,701,612	49,855,490	35,642,567	23,057,153	20,146,402
Project Management Unit	6.12					
PMU (8% of EDC)		8,439,450	3,269,212	2,337,218	1,511,944	1,321,076
Physical Contingency		843,945	326,921	233,722	151,194	132,108
Total PMU Cost		9,283,395	3,596,134	2,570,939	1,663,139	1,453,183
Total of CW & PMU	90.91	137,985,007	53,451,624	38,213,506	24,720,292	21,599,585
VAT (10% of Total)	9.09	13,798,501	5,345,162	3,821,351	2,472,029	2,159,958
Grand Total	100.00	151,783,508	58,796,786	42,034,857	27,192,321	23,759,543

Assuming that the ports are to be completed by 2008, the implementation schedule is proposed as follows:

Figure 11.4.14. Implementation Schedule



Based on the above implementation schedule, annual fund requirements are as follows:

Table 11.4.8. Annual Fund Requirements

Breakdown of Expenditures	% of Total	Total Amount (Php)	2006	2007	2008
Civil Works	84.79				
Estimated Direct Cost (EDC)		105,493,125		63,295,875	42,197,250
Overhead, Contingencies & Misc.					
OCM (10% of EDC)		10,549,313		6,329,588	4,219,725
Contractor's Profit (12% of EDC)		12,659,175		7,595,505	5,063,670
Total for Civil Works (CW)		128,701,613		77,220,968	51,480,645
Project Management Unit	6.12				
PMU (8% of EDC)		8,439,450	2,953,808	4,219,725	1,265,918
Physical Contingency		843,945	295,381	421,973	126,592
Total PMU Cost		9,283,395	3,249,188	4,641,698	1,392,509
Total of CW & PMU	90.91	137,985,008	3,249,188	81,862,665	52,873,154
VAT (10% of Total)	9.09	13,798,501	324,919	8,186,267	5,287,315
Grand Total	100.00	151,783,508	3,574,107	90,048,932	58,160,470

Noted: The cost estimation excludes the 41 km road upgrading requirement for Balud Port which is roughly estimated to be 540 million Pesos.

Table 11.4.9. Breakdown of Fund Requirement by Port

PILAR PORT				
Breakdown of Expenditures	Total Amount (Php)	2006	2007	2008
Civil Works				
Estimated Direct Cost (EDC)	40,865,156		24,519,094	16,346,062
Overhead, Contingencies & Misc.				
OCM (10% of EDC)	4,086,516		2,451,909	1,634,606
Contractor's Profit (12% of EDC)	4,903,819		2,942,291	1,961,527
Total for Civil Works (CW)	49,855,490		29,913,294	19,942,196
Project Management Unit				
PMU (8% of EDC)	3,269,212	1,144,224	1,634,606	490,382
Physical Contingency	326,921	114,422	163,461	49,038
Total PMU Cost	3,596,134	1,258,647	1,798,067	539,420
Total of CW & PMU	53,451,624	1,258,647	31,711,361	20,481,616
VAT (10% of Total)	5,345,162	125,865	3,171,136	2,048,1612
Grand Total	58,796,786	1,384,511	34,882,497	22,529,778

CATAINGAN PORT				
Breakdown of Expenditures	Total Amount (Php)	2006	2007	2008
Civil Works				
Estimated Direct Cost (EDC)	29,215,219		17,529,131	11,686,088
Overhead, Contingencies & Misc.				
OCM (10% of EDC)	2,921,522		1,752,913	1,168,609
Contractor's Profit (12% of EDC)	3,505,826		2,103,496	1,402,331
Total for Civil Works (CW)	35,642,567		21,385,540	14,257,027
Project Management Unit				
PMU (8% of EDC)	2,337,218	818,026	1,168,609	350,583
Physical Contingency	233,722	81,803	116,861	35,058
Total PMU Cost	2,570,939	899,829	1,285,470	385,641
Total of CW & PMU	38,213,506	899,829	22,671,010	14,642,668
VAT (10% of Total)	3,821,351	89,983	2,267,101	1,464,267
Grand Total	42,034,857	989,812	24,938,111	16,106,935

BOGO (POLAMBATO) PORT				
Breakdown of Expenditures	Total Amount (Php)	2006	2007	2008
Civil Works				
Estimated Direct Cost (EDC)	18,899,306		11,339,584	7,559,722
Overhead, Contingencies & Misc.				
OCM (10% of EDC)	1,889,931		1,133,958	755,972
Contractor's Profit (12% of EDC)	2,267,917		1,360,750	907,167
Total for Civil Works (CW)	23,057,153		13,834,292	9,222,861
Project Management Unit				
PMU (8% of EDC)	1,511,944	529,181	755,972	226,792
Physical Contingency	151,194	52,918	75,597	22,679
Total PMU Cost	1,663,139	582,099	831,569	249,471
Total of CW & PMU	24,720,292	582,099	14,665,861	9,472,332
VAT (10% of Total)	2,472,029	58,210	1,466,586	947,233
Grand Total	27,192,321	640,308	16,132,448	10,419,565

BALUD (CALUMPANG) PORT				
Breakdown of Expenditures	Total Amount (Php)	2006	2007	2008
Civil Works				
Estimated Direct Cost (EDC)	16,513,444		9,908,066	6,605,378
Overhead, Contingencies & Misc.				
OCM (10% of EDC)	1,651,344		990,807	660,538
Contractor's Profit (12% of EDC)	1,981,613		1,188,968	792,645
Total for Civil Works (CW)	20,146,402		12,087,841	8,058,561
Project Management Unit				
PMU (8% of EDC)	1,321,076	462,376	660,538	198,161
Physical Contingency	132,108	46,238	66,054	19,816
Total PMU Cost	1,453,183	508,614	726,592	217,977
Total of CW & PMU	21,599,585	508,614	12,814,433	8,276,538
VAT (10% of Total)	2,159,958	50,861	1,281,443	827,654
Grand Total	23,759,543	559,475	14,095,876	9,104,192

11.5 Proposed RoRo Operation and Standard Vessel Design

11.5.1 RoRo Demand Forecast

To estimate the demand for RoRo service, it is assumed that RoRo could offer more attractive service than all or some of the existing maritime transport services. Taking that passenger-cargo vessels and wooden-hulled vessels have similar vessel speeds, these vessels are assumed to serve in segments of the market that is likewise suitable for RoRo operation. On the other hand, fast craft market segments generally are willing to pay a premium for faster travel time – thus, though some users of fast craft may shift to RoRo, it is taken that fast craft users will continue using fast craft vessels.

In the case of Balud-Roxas RoRo corridor, the current cargo demand is very limited at this point. However, this is probably due to very weak infrastructure and maritime linkages. In an attempt to understand the potential for demand along this corridor, an estimate is made based on the potential traffic of two key commodities, bangus from Roxas and beef from Balud – both commodities are not commonly available in the other area and price differences are significant enough to justify trading. Using average per capita consumption and population of hinterland, the potential traffic is estimated. It is thus estimated that a potential of 185MT/week of live cattle will be transported from Masbate to Panay; and 70MT of bangus (including ice) will be transported from Panay to Masbate. Thus an additional 255MT/week could be potentially generated from better maritime service. It is expected that such volume may not be realized, but on the other hand, some other commodity such as cement would likewise have potential but is not accounted for – therefore, the estimate may actually be conservative.

Table 11.5.1. Classification of Existing Shipping Services

Corridor	2-way Demand (pax/wk or MT/wk)	Existing Service		
		Type (share%)	P/pax or MT	Hours
Masbate-Sorsogon	via Pilar: P: 10,500 C: 1,050	WHV (P: 50%; C: 80%)	P: 150 C: 600	3
		Fast craft (P: 50%)	P: 240	2
		Pass. Car (P: ltd.; C: 20%)	P: 150 C: 600	3
Masbate-Cebu	via Cataingan-Cebu City: P: 1,750 C: 540	Pass. Car.	P: 360 C: 500	11
			Bus from Mas – Cat: 70P, 2 hrs	
	via Masbate City-Cebu City: P: 1,100 C: 770	Pass. Car.	P: 360 C: 400~600	12
	via Cataingan-Mandaue City: C: 5,000 cases (or 55 MT)	Pass. Car.	n/a	n/a
Masbate-Panay	via Balud-Roxas: P: 550 C: 20	WHV	P: 150 C: 600	3.5
	via Balud-Estancia: P: 165 C: 70	WHV	P: 180 C: 600	5
	via Mandaon-Estancia: P: 160; C: ltd.	WHV	P: 250 C: 600	6

Note: P-Passengers, C – Cargo, Ltd. – Limited, WHV – wooden hulled vessels

The potential demand for RoRo is summarized in Table 11.5.2.

Table 11.5.2. Estimated Potential Demand at 3 RoRo Corridor at Present

RoRo Corridor	Passenger (pax/week), 2-way	Cargo (MT/week), 2-way
Masbate City-Pilar	5,250	1,050
Cataingan-Bogo	2,850	1,115
Balud-Roxas	875	90 + 255 potential traffic Total → 345

In the future, it is obviously expected that demand will increase with increasing population and income. In the formulation of the Domestic Shipping Development Plan, a national maritime demand forecast was made, and the growth of traffic between Origin-Destination pairs was estimated using growth patterns at respective ports. For the purpose of estimating the future demand on the three RoRo corridors, the computed growth rates given in Table 11.2.3 were utilized. Using these values, the estimated 2-way future demand at the 3 RoRo corridors, in terms of pax or MT/week, is given at Table 11.5.4.

Table 11.5.3. Ave. Annual Growth Rate of Study Corridor based on National Maritime O.D.

		2004-10	2010-15	2015-20	2020-25	2025-30
Masbate-Sorsogon	Cargo	7.6%	5.7%	3.9%	3.5%	3.2%
	Passenger	7.6%	5.6%	4.3%	3.9%	3.6%
Masbate-Cebu	Cargo	11.0%	7.6%	4.0%	3.6%	3.2%
	Passenger	1.7%	1.4%	1.1%	0.7%	0.4%
Masbate-Panay	Cargo	4.0%	3.1%	2.6%	2.3%	2.0%
	Passenger	5.2%	3.6%	3.1%	2.7%	2.3%

Table 11.5.4. Estimated Future Demand at the 3 RoRo Corridor (pax or MT/week), 2-way

		2004	2008	2010	2015	2020	2025	2030
Masbate City-Pilar	Cargo	1,050	1,435	1,626	2,144	2,599	3,089	3,608
	Passenger	5,250	7173	8,153	10,729	13,251	16,063	19,171
Cataingan-Bogo	Cargo	1,115	1762	2,086	3,014	3,668	4,376	5,133
	Passenger	2,850	3055	3,157	3,382	3,566	3,690	3,759
Balud-Roxas	Cargo	345	406	437	508	577	646	715
	Passenger	875	1084	1,188	1,419	1,650	1,881	2,112

In addition to the estimated demand for each RoRo route, the cargo demand between Bicol and Cebu, currently served by direct tramper shipping service by cargo vessels, are considered as potential demand for the routes of Pilar-Masbate and Cataingan Bogo. As shown in Table 11.5.5 the RRTS (Pilar-Masbate-Cataingan-Bogo-Cebu) has an advantage over direct shipping both in terms of travel time and transport cost.

About 40% of the cargo demand between Bicol and Cebu is cement and remaining is mostly general cargoes. It is assumed that half of general cargoes or 30% of total demand will be shift to RRTS and will therefore be added to the previously estimated cargo demand for Pilar-Masbate and Cataingan-Bogo as shown in Table 11.5.6.

Table 11.5.5. Comparison of RRTS and Direct Shipping between Bicol and Cebu

Section/Item	Travel Time (hr)		Transport Cost (P/MT)		Inventory Cost	
	RRTS	Direct Shipping	RRTS	Direct Shipping	RRTS	Direct Shipping
Pilar-Masbate	2.5 (RoRo)	20.4	250 (RoRo)	735	Limited	High
Masbate-Cataingan	2 (Road)		125 (Road)			
Cataingan-Bogo	5 (RoRo)		375 (RoRo)			
Bogo-Cebu	2 (Road)		125 (Road)			
Wait at Port	3	3	-	-		
Cargo Handling	-	-	0	257		
Total	14.5	23.4	875	992		

Table 11.5.6. Estimated Cargo Demand Diverted from Direct Shipping between Bicol and Cebu

	2004	2008	2010	2015	2020	2025	2030
Total Cargo Volume (MT/week)	1,660	1,898	2,017	2,383	2,709	3,061	3,446
Cargo Volume diverted to each routes of Pilar-Masbate and Cataingan-Bogo (MT/week, 30% of the total)	498	569	605	715	813	918	1,034

11.5.2 RoRo Vessel Operation at the Three RoRo Corridors

For the operation of the three corridors, the appropriate RoRo vessel is examined in this section. Due to technical considerations, only smaller size RoRo vessels are possible – in particular due to draft limitations. Thereby two candidate RoRo vessels discussed in the following section are considered.

The fare adopted is similar to existing services or same level – so that RoRo services would be competitive enough to attract and generate demand. Furthermore, the analysis was based on transport cost alone (excluding cargo handling cost) since the comparison was based on the same demand.

Based on the estimated RoRo demand, the RoRo operational parameters are shown in Table 11.5.7 to 11.5.9, comparing the two vessels in each of the three corridors.

In the analysis, the directional and seasonal imbalance in the demand was considered to arrive at a much reasonable estimate. From the adjusted demand, the number of required RoRo trips to cater for the weekly demand in the corridor was then computed from the passenger and cargo carrying capacity of the vessel. Based further on the analysis, the cargo was deemed more critical for the three corridors evident in a much higher load factor. Balancing the vessel capacity and traffic demand and taking into consideration the round trip time and the operating hours per day, among others, the minimum number of operational vessels required for each corridor was computed.

Based on this minimum number of vessels required, the total transport cost was computed from the running cost to operate the vessels, the fixed operation cost and the capital cost for acquiring the vessel. Considering the necessary period for preparation and construction of new RoRo vessel, starting year of the RoRo operation is assumed to be 2008 in the same year of the completion of the RoRo ports.

From the analysis, it is clear that the Type 1 (1,400 GT) RoRo vessel is more advantageous for the Pilar-Masbate Route and the Cataingan-Bogo Route having a

much lower total transport cost. Meanwhile, due to limited demand at this point, the smaller 1,000 GT RoRo vessel is advantageous for the Balud-Roxas corridor.

Table 11.5.7 RoRo Operation Plan for the Opening Year (Pilar-Masbate)

ITEM	UNIT	VESSEL TYPE	
		Type 1	Type 2
GT		1400	1000
Pax cap	pax	300	250
Cargo cap	trucks	12	6
Vessel Speed	knots	12	12
Pax Demand (2-way)	pax/week	7173	7173
Cargo Demand (2-way)	MT/week	2004	2004
Req'd Freq to Serve Demand	trips/week	19	37
Distance	n. mile	27	27
Round trip time	hr	6.5	6.5
Operating hrs/day	hr	16	16
Theoretical vessel requirement	units	1.4	2.8
Operational vessel requirement	units	2	3
Total Transport cost	mill. Peso	104.0	147.3
Pax Load Factor	%	45%	36%
Cargo Load Factor	%	39%	52%

Table 11.5.8 RoRo Operation Plan for the Opening Year (Cataingan-Bogo)

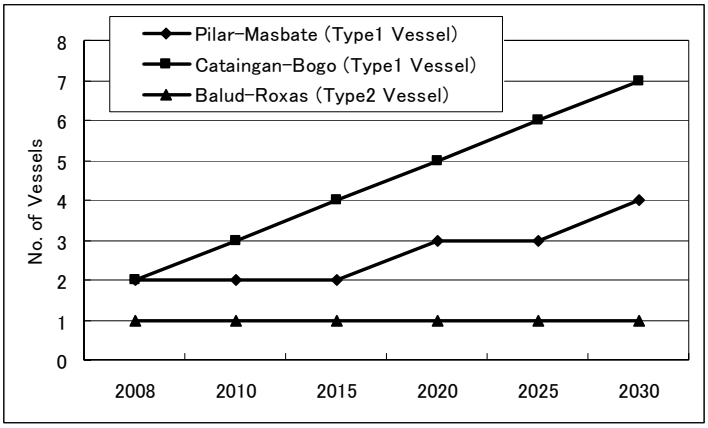
ITEM	UNIT	VESSEL TYPE	
		Type 1	Type 2
GT		1400	1000
Pax cap	pax	300	250
Car cap	trucks	12	6
Vessel Speed	knots	12	12
Pax Demand (2-way)	pax/week	3055	3055
Cargo Demand (2-way)	MT/week	2331	2331
Req'd Freq to Serve Demand	trips/week	16	43
Distance	n. mile	53	53
Round Trip Time	hr	10.8	10.8
Operating hrs/day	hr	16	16
Theoretical Vessel Requirement	units	2.4	6.5
Operational Vessel Requirement	units	2	6
Total Transport Cost	mill. Pesos	122	307.9
Pax Load Factor	%	58%	15%
Cargo Load Factor	%	67%	61%

Table 11.5.9 RoRo Operation Plan for the Opening Year (Roxas-Balud)

ITEM	UNIT	VESSEL TYPE	
		Type 1	Type 2
GT		1400	1000
Pax cap	pax	300	250
Cargo cap	trucks	12	6
Vessel Speed	knots	12	12
Pax Demand (2-way)	pax/week	1084	1084
Cargo Demand (2-way)	MT/week	406	406
Req'd freq to Serve Demand	trips/week	5	8
Distance	n. mile	30	30
Round Trip Time	hr	7.0	7.0
Operating hrs/day	hr	16	16
Theoretical Vessel Requirement	units	0.4	0.6
Operational Vessel Requirement	units	1	1
Total Transport Cost	mill. Pesos	45.9	44.1
Pax Load Factor	%	10%	32%
Cargo Load Factor	%	21%	32%

In accordance with the increase of demand, the required number of RoRo vessels for each route will increase as shown in Figure 11.5.1.

Figure 11.5.1. Required Number of RoRo Vessels by Corridor



Based on the above-mentioned RoRo vessel assignment plan, average load factors of passenger and cargoes in each midway year are calculated as shown in the figures below.

Figure 11.5.2. Average Passenger Load Factor by Route

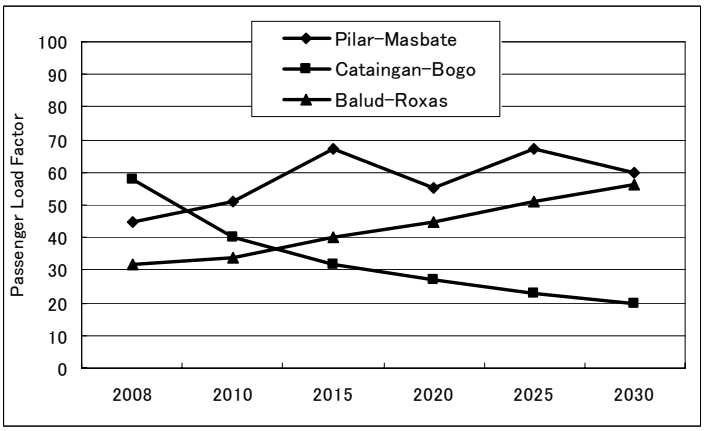
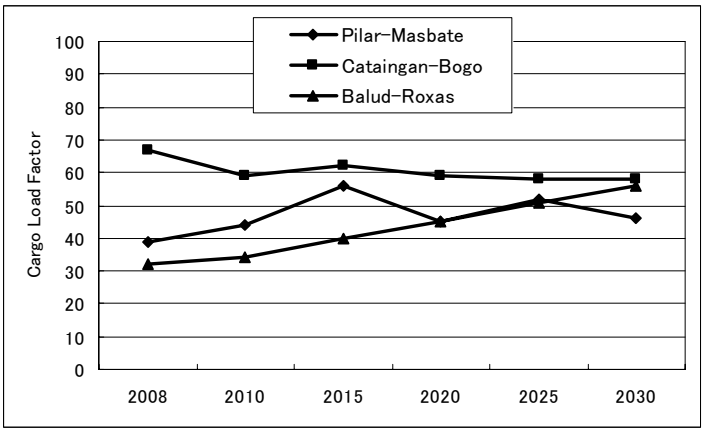


Figure 11.5.3. Average Cargo Load Factor by Route



11.5.3 Standard Design of RoRo Vessel

(1) DESIGN CONDITIONS

Based on the field survey and analysis on the existing conditions of pilot project routes such as existing port facilities and RoRo terminals, water depth, traffic of passengers and cargo trucks etc., it was found that the following vessel particulars are shall be satisfied in the design of RoRo vessels to be assigned to the pilot project routes:

- Cruising speed : about 12 knots
- Vessel draft : about 2.6m
- Passenger : 300 pax & 250 pax (2 cases)
- Loading capacity (Truck 8.5m length) : 12 units & 6 units (2 cases)

More explicitly, small RoRo vessels are considered. The primary reason is the limitation of port depths.

(2) SPECIFICATIONS

Principal particulars of the proposed RoRo vessels are summarized in the table below. This table shows the basic technical specifications of two types of RoRo vessels in terms of capacity size. The proposed vessels do not have high-technical equipment because they will be assigned to short-haul service operation. Basic considerations on designing RoRo vessels are as follows:

General: The vessel shall be designed and built as twin-propeller with two-diesel engine driven, RoRo passenger ferry with a ramp at stern, intended for the transport of trucks, buses and passengers in the domestic coastal voyage.

Rules & regulations: The vessel shall follow the rules & regulations of the Republic of the Philippines and classification society.

Table 11.5.10. Principal Particulars of RoRo Vessel

Particulars	300 passengers	250 passengers
1. Dimensions Length (over all) Length (p.p.) Breadth (mld) Depth (mld) (Freeboard deck) Draft (mld)	 About 60m 56.00m 11.80m 4.00m 2.60m	 About 50m 45.00m 11.80m 4.00m 2.60m
2. Gross Tonnage (International)	About 1,400T	About 1,000T
3. Cruising Area	Coastal	Coastal
4. Deadweight	About 400t	About 300t
5. Ship speed (Main engine normal output, 15% sea margin)	About 12 knots	About 12 knots
6. Complement	12 persons	12 persons
7. Passenger (seat)	About 400 persons	About 250 persons
8. Loading capacity (Truck)	12 units (8.5m length)	6 units (8.5m length)
9. Main engine, diesel, MCR	About 1,500ps, 2 sets	About 1,000ps, 2 sets
10.Propeller, fixed pitch	2 sets	2 sets
11. Ramp door (stern ramp)	1 set	1 set
12. Estimated ship's price	P 280 mil. P 224 mil. (The case when NMEC ship building project is implemented)	About 220 mil. Pesos P 176 mil. (The case when NMEC ship building project is implemented)

(3) DESIGN

Both of the proposed RoRo vessels are small vessel. Therefore, easiness of construction and low construction cost has to be considered in design work. Basic design philosophies of the proposed RoRo vessel are as follows:

- Simple construction system to be applied
- Continuity of steel plate to be arranged as far as possible
- Kind of steel plate or angle bar to be minimized

Easy maintenance equipment to be selected: Common use of spare parts, i.e. main engine and generator engine, or other pumps, if any.

Space-saving design to be employed: Height of machinery space to be lowered as far as possible, to make more space for passenger and car deck space.

Flexible lay-out for alteration between passenger space and car space: Car space and passenger space to be arranged so as to be interchangeable

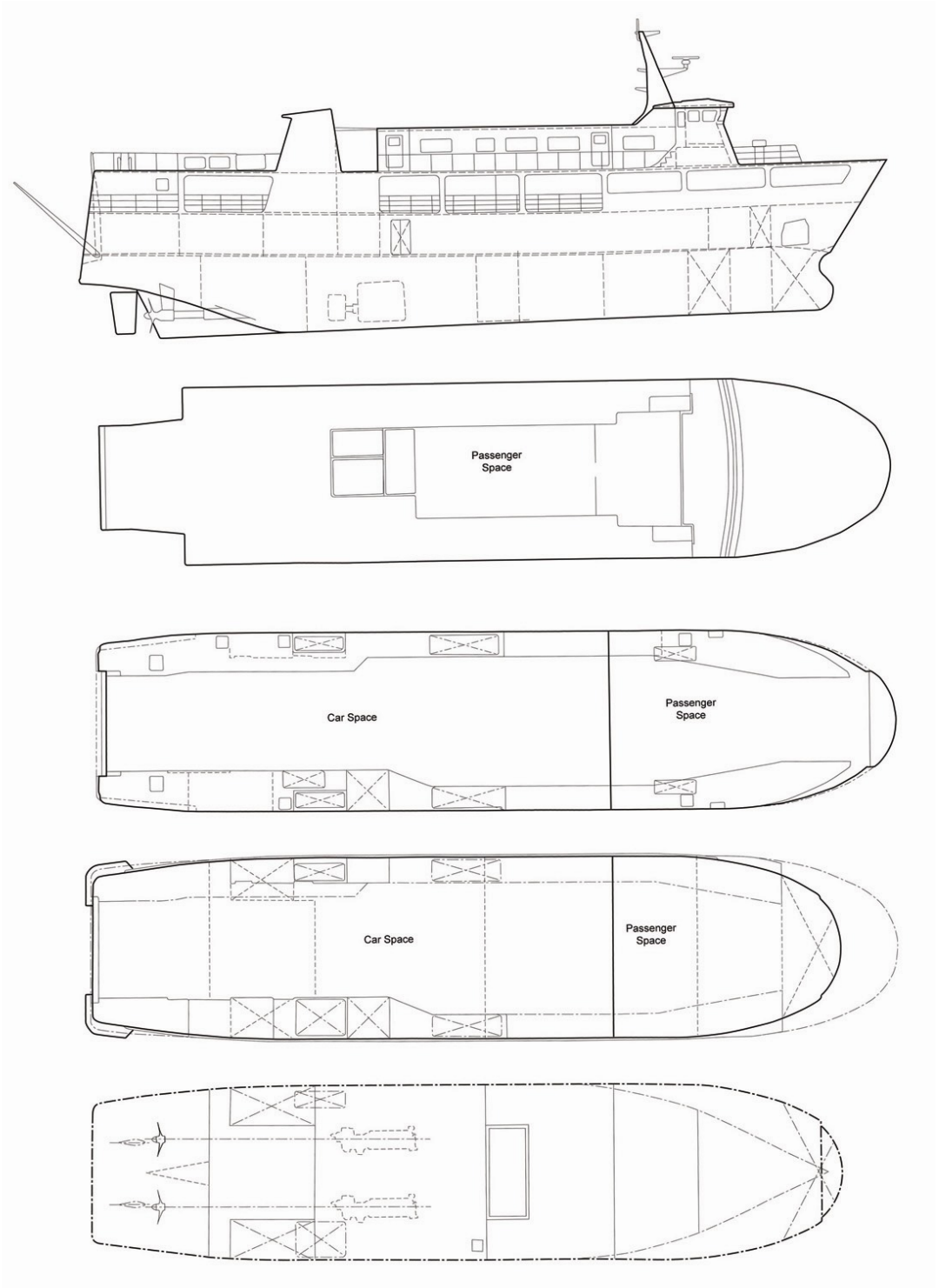
In design work, the flexibility of vessel structure was considered to meet with the change of necessary capacity of passengers and rolling vehicles. In other words, it has to be adjustable by shifting partition between passenger compartment and car compartment or by rearranging upper-deck passenger space.

The vessel is equipped two sets of engines and propellers to assure navigation speed, maneuverability and course stability necessary for the pilot RoRo route. A ramp door will be provided at aft-end to fit it with the RoRo ramp at terminals.

The major difference of basic specifications between 300 passenger vessel and 250-passenger vessel is in vessel length, i.e. 56m and 45m, respectively. Both are applied the same breadth and depth. This will allow the same design of engine room and fore part for both vessels.

Figure 11.5.4 shows the general arrangement of the proposed RoRo vessel (type for 300 passengers).

Figure 11.5.4. General Arrangement Plan for RoRo Vessel (400 Pax)



(4) CONSTRUCTION

In the construction stage of proposed vessel, the followings shall be given sufficient considerations in overall management:

- Plan and implementation of construction work schedule
- Monitoring and adjustment of construction work schedule
- Constant verification of the timing of procurement plan for material and equipment and construction work schedule

11.5.4 RoRo Vessel Quotation Survey

On August 2005, the study team conducted a workshop for shipbuilders and shipping companies to present the specifications of the RoRo vessels as discussed in the previous section. Nine (9) medium and large scale shipyards and four (4) shipping companies attended the said workshop. Subsequently, a survey form was handed out to the shipbuilders present to gather relevant information regarding their capability to construct such vessels and verify the preliminary cost estimates conducted by the Study Team. Furthermore, the survey forms were also sent to other shipyards to get a variety of responses. However, only five shipyards have responded to the survey. Other shipyards declined to answer for lack of spare time.

The result of the survey is shown in the Table 11.5.11 to Table 11.5.13.

One shipyard proposed a catamaran 2 concept design. Their proposed catamaran vessel has the following features

Table 11.5.11. Properties of Proposed Catamaran Ropax

	Design 1	Design 2
Structure	Aluminum	Steel Hull/Aluminum Superstructure
LOA	56m approx	64.5 approx.
Beam	16.5 approx	20m approx.
Depth	3.5m approx	5m approx.
Draft	1.6m approx	2.4m approx.
Loaded displacement	310T	900T approx.
Light displacement	170T	420T approx.
Deadweight	140T	470T approx.
Speed	15 knots	15 knots approx.
Pax…	250+	400+
Main Engines…	4x300kW	4x600kW
Propellers	4 Sets	4 sets
Ramps	Fwd & Aft	Fwd & Aft
Price	PhP 224 Mill	PhP 308 Mill

Figure 11.5.5 Example of a Catamaran Ropax

Photos courtesy of FBMA Marine Inc.

Table 11.5.12. Survey Summary of Shipyard Quotation for 400Pax Ship

(in Pesos)	SHIPYARD A	SHIPYARD B	SHIPYARD C	SHIPYARD D
	1400 GT	**1400 GT**	**1400 GT**	**1400 GT**
LOA	56 m	56 m	56 m	56m
Total Construction Cost	264,963,860	233,000,000	139,980,000	135,950,000
Hull Part				
- Construction	45,935,260	145,000,000	55,500,000	23,700,000
- Equipment	38,306,500		7,650,000	15,830,000
- Outfitting	30,793,500		3,625,000	1,650,000
- Labor	23,442,600		28,000,000	14,330,000
Machinery Part				
- Engine	34,500,000	70,000,000	37,200,000	44,820,000
- Aux. Machinery	26,005,100		3,575,000	12,650,000
- Outfitting	49,805,200		625,000	3,080,000
- Labor	5,545,700		1,640,000	4,290,000
Electrical Part				
- Electric Equip.	4,375,000	8,000,000	500,000	2,800,000
- Outfitting	2,905,000		250,000	3,000,000
- Radio Equip.	850,000		615,000	2,000,000
- Labor	2,500,000		800,000	1,300,000
Others		10,000,000		
Construction Duration (months per ship)	14 months	12 months	9.5 months	12 months

Table 11.5.13. Survey Summary of Shipyard Quotation for 250 Pax Ship

(in Pesos)	SHIPYARD A	SHIPYARD B	SHIPYARD C	SHIPYARD D
	1000 GT	**1000 GT**	**1000 GT**	**1000 GT**
LOA	45 m	45 m	45 m	45 m
Total Construction Cost	207,979,760	192,800,000	109,985,000	93,040,000
Hull Part				
- Construction	39,544,960	115,000,000	46,500,000	21,730,000
- Equipment	30,521,000		5,188,000	15,070,000
- Outfitting	25,921,400		2,812,000	1,650,000
- Labor	19,670,400		24,100,000	10,970,000
Machinery Part				
- Engine	26,500,000	63,000,000	24,600,000	20,880,000
- Aux. Machinery	20,000,000		2,650,000	10,460,000
- Outfitting	33,851,700		525,000	2,080,000
- Labor	4,675,000		1,520,000	3,080,000
Electrical Part				
- Electric Equip.	3,674,800	7,800,000	450,000	2,400,000
- Outfitting	1,270,500		225,000	2,000,000
- Radio Equip.	850,000		615,000	1,800,000
- Labor	1,500,000		800,000	1,000,000
Others		7,000,000		
Construction Duration (months per ship)	12 months	11 months	8 months	10 months

11.6 Preliminary Evaluation of the Pilot Project

Based on the development plans for the selected routes elaborated in the previous chapters, the pilot projects are analyzed by route from the viewpoints of national economy and financial viability.

It should be noted that the study adopted a rather conservative demand forecast by focusing only on existing demand. It is very likely that the project would generate "new" or "induced" demand. However, further studies and data collection is needed to derive a practical and acceptable estimate.

11.6.1 Preliminary Economic Analysis

(1) ASSUMPTIONS

Economic analysis is made by comparing the conditions between with and without project, i.e., the introduction of RoRo vessel operation for the selected routes along with the RRTS scheme.

In order to introduce RoRo vessels in the new routes, terminal facilities should be improved in addition to the procurement cost of RoRo vessels.

On the other hand, when RoRo vessels are operated, the following benefit can be expected in general.

1) Reduction of transport Cost Through:
   - Higher efficiency in cargo handling
   - Reduction of required time for port stay
   - Higher Transport Efficiency due to the increase in transport capacity and operation speed
2) Reduction of travel time for passengers
3) Upgrading of maritime transport safety
4) Expansion of shipping related industry
   - Expansion of shipbuilding industry
   - Expansion of related services including insurance, finance, forwarders
   - The cost and benefit mentioned above will be estimated by route in the succeeding sections.

(2) MASBATE - PILAR

1) Traffic Demand

The total transport demand is summarized as follows.

Table 11.6.1. Transport Demand for Masbate-Pilar

Demand	2005	2015	2020
Passengers (pax/yr)	273,000	557,900	689,100
Cargo (ton/yr)	80,500	148,600	177,400

2) Benefit Estimation

The estimated benefits for Masbate-Pilar route are summarized in Table below.

Table 11.6.2. Estimated Benefit (Million Peso)

Benefits	New Vessel		Second Hand Vessel	
	2008	2020	2008	2020
Transport Cost Savings	13.7	34.8	12.2	29.1
Passenger Time Cost Savings	5.4	11.4	5.4	11.4
Accident Cost Reduction	3.0	6.6	3.0	6.6
Total Benefit	22.1	52.7	20.7	47.1

Transport Cost Savings: The transport cost required to serve the passenger and cargo demand in the route for Masbate-Pilar is estimated for the three cases: "Without the Project" (banca boat) and "With the Project" (new and second hand vessels) as shown in Table 11.6.3. It is also assumed that the operation will start in mid-2008, taking into account the construction work at Pilar port.

Table 11.6.3. Assumed RoRo Vessels and Banca Boat

Description	RoRo Ship (New)	RoRo Ship (Second-Hand)	Banca Boat
Ship Age	New	15	10
Length (m)	56	53	18
Breadth (m)	11.8	12	2.4
Depth (m)	4	3.7	1.45
Draft (m)	2.6	2	0.5
Speed (knot)	12	12	8
Passenger Capacity (pax)	300	390	38
Cargo Capacity (tons)	12 trucks	165 ton	1.5 ton

The unit transport costs estimated from shipping operation report to MARINA shown in Chapter 8 are used for the transport cost estimation. The transport cost savings of the "With" case compared to the "Without" case is estimated to be P13.7 million for new vessel and P12.2 million for secondhand vessel, respectively in 2008. The cost difference is regarded as a benefit in terms of the transport cost savings attributed by the RoRo vessel introduction. The cost difference will increase to P34.8 million in 2020 in accordance with the demand growth. New RoRo vessel shows more transport cost saving than second hand vessel.

Passenger Time Cost Savings: The operating speed of banca boat is considerably low when compared to RoRo vessels. By introducing RoRo, the travel times of the passengers will be reduced. Time value is estimated from the per capita GDP in 2003, P56,109/person. As a result, the passenger time cost savings are estimated as shown in Table 11.6.2.

Reduction of Maritime Accidents: It is well known that banca boat is vulnerable to stormy weather; therefore a number of maritime accidents of banca boats have been reported. Among the various types of accidents include: explosion and fire, sinking and capsizing which are likely to involve fatality.

According to the statistics on maritime accidents, there were 694 accidents during the five year period from 1998 to 2002. Among them, approximately 20% are those of banca boat. In particular, the rate of serious accidents stated above is 1.5 accidents per million vessel-miles in case of banca boat, while 0.997 accidents per million vessel-miles for steel hulled vessels. The average number of victims per serious accident is calculated as shown in Table 11.6.4.

Table 11.6.4. Number of Victims due to Maritime Accidents (1998-2002)

	Death	Missing	Injured	Total
Total number of victims	553	328	128	1,009
Victims/serious accident	1.7	1.0	0.4	3.1

Source: PCG-BMI Records and Marine Protests

By introducing a RoRo vessel in the route, accident rates as well as the number of victims are expected to decrease. Due to the limited information regarding accidents, the expected reduction of accident cost was estimated only for the victims. Assuming that the cost of victims is the accumulated present value of per capita GDP, the accident reduction benefit is estimated as 3.2 million Pesos in 2008 and 7.8 million Pesos in 2020.

3) Cost Estimation

As for the cost required for the RoRo operation, port improvement cost and ship procurement cost will be figured out. The port of Masbate already has sufficient facilities for RoRo operation, while the port of Pilar would need new port facilities for RoRo operation to materialize. Hence, the construction cost of Pilar port is accounted as the cost for the evaluation. As elaborated in the previous chapter, the annual cost for the construction is summarized as follows.

Table 11.6.5. Project Cost of Pilar Port

Scheduled Year	Project Cost (P mil.)
2006	1.38
2007	34.88
2008	22.53
Total	58.80

Regarding the ship procurement cost, annual cost (depreciation cost) for RoRo vessels to accommodate the expected demand is estimated and assumed that vessels are continuously being replaced whenever necessary. On the other hand, the depreciation cost of banca boat will be estimated for the case of Without the Project. The difference of the annual costs of RoRo and banca boat will be the cost for the economic analysis.

Table 11.6.6. Annualized Cost of Vessels (Million Peso per Year)

Year	RoRo	Banca	Difference
2008	16.2	0.2	16.0
2020	30.2	0.4	29.8

4) Economic Evaluation

Cost and benefit flow estimated above are compared for the evaluation. The result shown in Table 11.6.7 indicates that the project of RoRo operation for Masbate-Pilar is highly economically viable.

Table 11.6.7. Economic Evaluation Indicators for Masbate-Pilar

Indicator	New RoRo Vessel	Second Hand RoRo Vessel
Benefit Cost Ratio (B/C)	1.07	1.41
Net Present Value (million Pesos)	11.3	44.9
Internal Rate of Return (EIRR)	17.4%	24.0%

Note: Discount Rate is assumed as 15%

(2) CATAINGAN – BOGO

1) Traffic Demand

The total transport demand between Cataingan, Masbate and Bogo, Cebu is summarized as follows.

Table 11.6.8. Transport Demand for Cataingan - Bogo

Demand	2005	2015	2020
Passengers (pax/yr)	148,200	175,900	184,800
Cargo (ton/yr)	83,800	193,900	233,000

2) Benefit Estimation

In a similar way, the transport cost savings are estimated by comparing the costs of without project case (currently passenger cargo ships are operated for Cataingan-Cebu) and “with a project case” (RoRo introduction to the route). Two type of RoRo vessel and passenger cargo ship shown in Table 11.6.9 are assumed for the “With” and “Without” cases, respectively.

Table 11.6.9. Assumed Vessels for the Analysis

Description	RoRo Ship (New)	RoRo Ship (Second-Hand)	Passenger Cargo
Ship Age	New	15	24
Length (m)	56	53	36
Breadth (m)	11.8	12	7.4
Depth (m)	4	3.7	1.85
Draft (m)	2.6	2	1
Speed (knot)	12	12	8
Passenger Capacity (pax)	300	390	300
Cargo Capacity	12 trucks	165 ton	50 ton

Regarding the transport cost, the total cost between Cataingan and Cebu/Mandaue is estimated for each case because Cebu/Mandaue is the main origin/destination of transport demand. Accordingly, the land transport costs by either buses or trucks are estimated in addition to the RoRo operation cost for Cataingan – Bogo in the case of “With the Project”.

In addition to the transport cost savings, passenger time cost savings are estimated as a benefit. As a result, the benefit of the project is estimated by calculating the difference of both cases as follows.

Table 11.6.10. Estimated Benefit (Million Peso)

Benefits	New Vessel		Second Hand Vessel	
	2008	2020	2008	2020
Transport Cost Savings	51.3	81.1	43.0	51.5
Passenger Time Cost Savings	5.5	6.5	5.5	6.5
Total Benefit	56.8	87.7	48.5	58.0

3) Cost Estimation

As a project cost, the improvement costs for both Cataingan and Bogo ports are required to enable the RoRo operation. The port improvement costs are summarized in Table 11.6.11.

Table 11.6.11. Project Cost of Cataingan and Bogo Port (Million Peso)

Scheduled Yr	Cataingan	Bogo	Total
2006	0.99	0.64	1.63
2007	24.94	16.13	41.07
2008	16.11	10.42	26.53
Total	42.04	27.19	69.23

The vessel cost is also estimated by calculating the difference of RoRo and passenger-cargo ship requirements for accommodating the future transport demand in the same way as the case of Masbate-Pilar.

4) Economic Evaluation

As a result of economic analysis, EIRR is 15.5% for new RoRo vessel and 23.0% for second hand RoRo vessel as shown in Table 11.6.12. Consequently, the RoRo operation in Cataingan- Bogo is regarded as viable from the standpoint of national economy.

Table 11.6.12. Economic Evaluation Indicator for Cataingan – Bogo

Indicator	New RoRo Vessel	Second Hand RoRo Vessel
Benefit Cost Ratio (B/C)	1.003	1.075
Net Present Value (million Pesos)	1.0	15.9
Internal Rate of Return (EIRR)	15.5%	23.0%

Note: Discount Rate is assumed as 15%

(3) BALUD – ROXAS CITY

1) Traffic Demand

The total transport demand between Balud, Masbate and Roxas City is summarized as follows.

Table 11.6.13. Transport Demand for Balud – Roxas City

Demand	2005	2015	2020
Passengers (pax/yr)	45,500	73,800	85,800
Cargo (ton/yr)	18,000	26,400	30,000

2) Benefit Estimation

In a similar way, the transport cost savings are estimated by comparing the costs of without project case (currently banca boats are operated for Balud-Roxas) and

"with a project case" (RoRo introduction to the route).

Two type of RoRo vessel and passenger cargo ship shown in Table 11.6.14 are assumed for the "With" and "Without" cases, respectively.

Regarding the transport cost, the total cost between Balud, Masbate and Roxas City is calculated for each case to estimate transport cost savings. In addition to this, passenger time cost savings and accident cost reduction are estimated as a benefit. As a result, the benefit of the project is estimated by calculating the difference of both cases as shown in Table 11.6.15.

Table 11.6.14. Assumed Vessels for the Analysis

Description	RoRo Ship (New)	RoRo Ship (Second-Hand)	Banca Boat
Ship Age	New	15	10
Length (m)	45	53	18
Breadth (m)	11.8	12	2.4
Depth (m)	4	3.7	1.45
Draft (m)	2.6	2	0.5
Speed (knot)	12	12	8
Passenger Capacity (pax)	250	390	38
Cargo Capacity	6 trucks	165 ton	1.5 ton

Table 11.6.15. Estimated Benefit (Million Peso)

Benefits	New Vessel		Second Hand Vessel	
	2008	2020	2008	2020
Transport Cost Savings	0.9	1.9	-0.8	-1.6
Passenger Time Cost Savings	1.6	2.6	1.6	2.6
Accident Cost Reduction	0.4	0.6	0.4	0.6
Total Benefit	2.8	5.1	1.2	1.6

3) Cost Estimation

As a project cost, the improvement costs for Balud ports are required to enable the RoRo operation. The port improvement costs are summarized in Table 11.6.16.

Table 11.6.16. Project Cost of Balud Port (Million Peso)

Scheduled Yr	Balud
2006	0.56
2007	14.10
2008	9.10
Total	23.76

The vessel cost is also estimated by calculating the difference of RoRo and passenger-cargo ship requirements for accommodating the future transport demand in the same way as the case of Masbate-Pilar.

4) Economic Evaluation

As a result of economic analysis, EIRR is not able to calculate because the cost is very high compare to the benefit due to low demand on this route. Therefore, the RoRo operation in Balud-Roxas City is not viable from the standpoint of national economy at this moment.

Table 11.6.17. Economic Evaluation Indicator for Balud – Roxas City

Indicator	New RoRo Vessel	Second Hand RoRo Vessel
Benefit Cost Ratio (B/C)	-	-
Net Present Value (million Pesos)	-29.5	-24.3
Internal Rate of Return (EIRR)	-	-

Note: Discount Rate is assumed as 15%

11.6.2 Preliminary Financial Analysis

Financial analysis is undertaken for examining the operational conditions of the new RoRo vessel for the pilot route from the financial viewpoint. Since Balud-Roxas City route is not economically viable, it was excluded from the financial analysis.

(3) MASBATE - PILAR

1) Ship Procurement Method

For undertaking the financial analysis, the following methods of ship procurement are considered;

a. Ordinary ship purchase by using long term loan

- Equity-Loan ratio is tentatively assumed to be 20%:80%
- As for the long term loan, the following conditions are assumed:
  - Commercial Bank Loan Case: Repayment period: 5 yrs with interest rate of 13% p.a.
  - JBIC Sub-loan Case: Repayment period: 10years with interest rate of 10.7% p.a. and grace period of 1 year.

b. Lease purchase through NMEC

- The lease period is assumed as 10 years.
- The lease charge will include the interest of 10% p.a.
- 10% of procurement cost will be required as a lease deposit, which will be the residual value of the asset at the end of the term.

When not mentioned specifically, the procurement method in the analysis will be the ordinary ship purchase by using loans.

2) Tariff Rate

The tariff rate of banca boat currently operated in the route will be applied.

- Passenger: P140/person (P5.2/person/mile)
- Cargo: P500/ ton (P18.5/ton/mile)

As for trucks, additional charge is assumed as follows, taking into account the present RoRo service freight rate of trucks between Iloilo-Bacolod.

- Trucks (loading capacity: 8 ton): 2,000 Pesos/truck

2. Vessel Operation Cost

The operation costs of the new RoRo vessel is assumed by referring the cost parameters of existing representative vessels as shown in Chapter 7. Operation cost parameters of the new RoRo vessel assumed in the financial analysis are summarized in the table below.

Table 11.6.18. Operation Cost Parameters of the New RoRo Vessel

Cost Parameters	Unit	Cost
Fixed Operation Cost	Million Peso/year	24.2
Running Cost	Peso/n.m.	308
Call Cost	Peso/call	136
Repair Cost	Million Peso/year	0.7
Cargo Handling Cost	Peso/MT	80
Depreciation Cost	Million Peso/year	1.3

3) Other Conditions

- Shipping operation is scheduled to start in 2008, taking into account the port construction period.
- Inflation rate is assumed to be 5.3% p.a., which is the average rate during the past five years.

4) Vessel Operation

The operation of new RoRo vessel is summarized in the table below. It is assumed that of one vessel will operate two round trips per day or 676 round trips per year.

Table 11.6.19. RoRo Vessel Operation (Pilar-Masbate)

Route Distance (N.M.)	27
Speed (knot)	12
Round Trip Hours (including port time)	6.5
Operating hours/day	16
Number of round trips/day	2
Commissionable days	338
Total round trips/year	676

5) Annual Operation Cost and Tariff Revenue

The annual operation cost and revenue are estimated based on the above assumptions. The annual revenue for one RoRo vessel is estimated based on the demand and average load factors of all RoRo vessels operated in the route.

The annual operating revenue of the new RoRo vessel is calculated according to the following procedure:

- Annual operating revenue is composed of the revenue from passengers, cargo and trucks.
- The average load factor is decided by route by using the future demand and vessel operation schedule shown in Fig.11.5.6.
- The revenue is estimated by the following formula: (Loading Capacity)x (Loading Factor) x (Number of Round Trips/yr) x (Unit Tariff Rate)
- Number of round trips per year is estimated by (Commissionable days) / 7 x (Round Trips per week).
- The actual operating revenue is calculated by multiplying the annual inflation rate.
- The revenue in the first year (2008) is assumed to be only the half of the annual revenue, since the port construction will be completed in the

mid-2008.

- The annual variation of the revenue is mainly owing to the changes in the load factor determined by the fleet operation schedule in the corresponding route.

The annual operating cost of the new RoRo vessel is calculated according to the following procedure:

- The annual operating cost consists of “Fixed Cost”, “Mileage related Cost”, “Cargo Handling Cost”, “Port Charge” and “Repair Cost”.
- The unit fixed cost including crew cost, insurance cost and administration cost etc. is expressed by million pesos / vessel /day.
- The unit mileage cost mainly indicating the fuel cost is expressed in terms of million peso/vessel mile.
- Unit cargo handling cost indicating the cargo handling cost at port is expressed in million pesos /tonnage.
- Unit port charge is expressed in million pesos /vessel call.
- Unit repair cost including docking cost, maintenance cost etc. is expressed by million pesos/ vessel /yr
- In case of newly built vessels, it has longer commissionable days, therefore, annual mileage will increase, then the total annual mileage cost will increase. At the same time, the annual repair cost drastically reduced compared to old vessels.
- On the other hand, total loading cargo and passengers will increase due to the higher commissionable days.

6） Financial Indicators by Procurement Method

Here, the financial indicators of three vessel procurement methods are estimated. In addition to the ordinary procurement methods such as commercial loan and JBIC sub-loan, the method of RoRo vessel procurement by means of lease purchase through NMEC is also examined. The prominent merit of employing this method is that the initial cost is lowered to only 10% of the vessel cost as a deposit without any additional collateral.

As a result of the cash flow analysis, the following financial indicators are obtained. as shown in table below. The FIRR (Financial Internal Rate of Return) of the new RoRo operation is estimated with a favorable level of 17.2%, while The ROE (Return of Equity) is 11.4% when NMEC lease-purchase method is applied. Therefore, the operation of new RoRo vessel in the Pillar-Masbate route is financially feasible and profitable for the operator if NMEC lease-purchase method is employed.

Table 11.6.20.Financial indicators by Procurement Method (Pilar-Masbate)

Indicators	Comm. Loan	JBIC sub-loan	NMEC Lease
FIRR	17.2%		
ROE	0.2%	5.9%	11.4%

Cash flow of the new RoRo vessel operation including revenues, expenditures and other financial parameters is shown in Table 11.6.21.

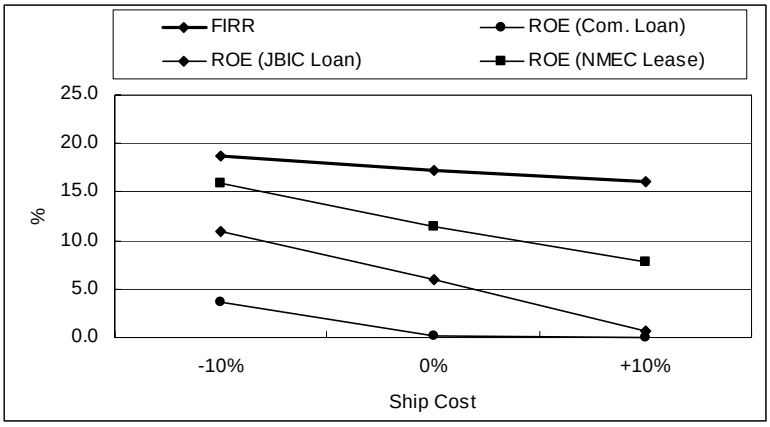
7） Sensitivity Analysis

Although newly built RoRo vessels will be profitable under the assumed conditions, the sensitivity analysis is undertaken from the financial viewpoint.

a. Vessel Procurement Cost: The sensitivity of vessel procurement cost to the financial indicators is examined as shown in Figure 11.6.1. Obviously the

financial indicators will be improved if the cost is decreased. On the other hand, FIRR and ROE will be still at a favorable level under condition of NMEC lease-purchase method even if procurement cost is increased.

Figure 11.6.1. Sensitivity of Vessel Procurement Cost (Pilar-Masbate)



b. Freight Rate: The sensitivity of freight rate to the financial indicators is examined as shown in Figure 11.6.2. Obviously the financial indicators will be improved significantly when the freight rate is increased. On the other hand, the operation of new RoRo vessel is not so profitable when freight rate is reduced even if NMEC lease-purchase method is applied.

Figure 11.6.2. Sensitivity of Freight Rate (Pilar-Masbate)

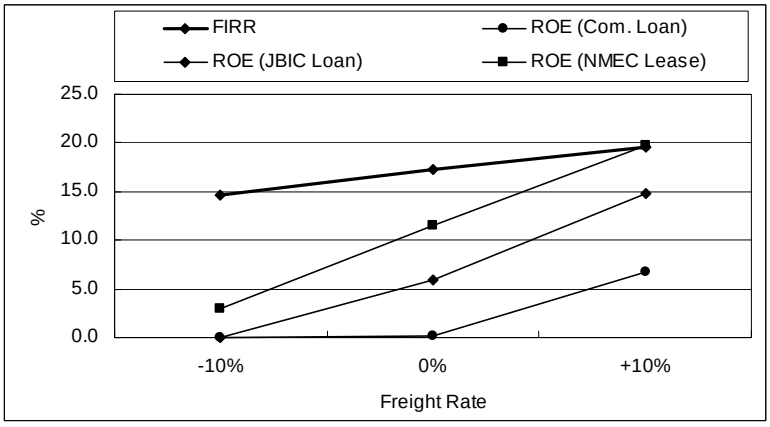


Table 11.6.21. Cash Flow of New RoRo Vessel Operation (Pilar-Masbate, NMEC Case)

PROFIT LOSS STATEMENT			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
million pesos	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1.OPERATING REVENUE	0	0	23	54	63	73	85	99	115	134	130	126	121	118	114	128	144	163	185	210
1)Tariff REVENUE	0	0	23	54	63	73	85	99	115	134	129	124	120	116	111	126	142	160	181	204
2)INTEREST	0	0	0	0	0	0	0	0	0	1	1	2	1	3	2	2	3	3	5	5
2.OPERATING EXPENSE																				
1)OPERATING COST	0	0	16	34	33	36	37	40	51	56	48	49	51	53	55	59	63	67	71	76
2)DEPRECIATION	0	0	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	0	0	0
3.OPERATING PROFIT	0	0	-8	4	14	22	32	43	49	63	67	61	54	49	43	53	66	96	114	133
4.OTHER EXPENSES	0	0	34	37	39	40	41	40	38	35	34	34	0	0	0	0	0	0	0	0
1)FINANCIAL COST																				
-LEASE CHARGE	0	0	34	34	34	34	34	34	34	34	34	34	0	0	0	0	0	0	0	0
-INTEREST FOR SHORT TERM	0	0	0	3	5.0	5.9	6.3	5.5	4	1	0	0	0	0	0	0	0	0	0	0
2)SALES TAX																				
5.NET PROFIT BEFORE TAX	0	0	-43	-33	-25	-18	-8	3	11	28	33	27	54	49	43	53	66	96	114	133
6.INCOME TAX	0	0	0	0	0	0	0	1	3	9	10	9	17	16	14	17	21	31	37	43
7.NET PROFIT AFTER TAX	0	0	-43	-33	-25	-18	-8	2	7	19	22	18	37	34	29	36	45	66	78	91
8.DIVIDENTS																				
9.RETAINED EARNINGS	0	0	-43	-33	-25	-18	-8	2	7	19	22	18	37	34	29	36	45	66	78	91

CASH FLOW STATEMENT			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
million pesos	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1.SOURCE OF FUNDS	7	17	-0	27	45	54	57	51	35	43	48	42	70	65	59	69	82	96	114	133
1)NET PROFIT BEFORE TAX	0	0	-43	-33	-25	-18	-8	3	11	28	33	27	54	49	43	53	66	96	114	133
2)DEPRECIATION	0	0	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	0	0	0
3)SHORT TERM LOAN	0	0	27	45	54	57	50	32	9	0	0	0	0	0	0	0	0	0	0	0
4)OWN FUND (EQUITY)	7	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5) LONG TERM LOAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.APPLICATION OF FUNDS	7	17	0	27	45	54	57	51	35	18	10	9	17	16	14	17	21	31	37	43
1)DEPOSIT	7	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2)REPAYMENT OF SHORT LOAN	0	0	0	27	45	54	57	50	32	9	0	0	0	0	0	0	0	0	0	0
3)REPAYMENT OF LONG LOAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4)INCOME TAX	0	0	0	0	0	0	0	1	3	9	10	9	17	16	14	17	21	31	37	43
5)DIVIDENTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.CASH SURPLUS(SINGLE YR)	0	0	-0	0	-0	0	-0	-0	-0	25	38	34	52	49	45	52	61	66	78	91
4.CASH SURPLUS(ACCUML.)	0	0	-0	0	-0	-0	-0	-0	-0	25	63	97	149	198	243	295	355	421	498	589

(4) CATAINGAN - BOGO

1) Assumptions

As is the case with Masbate City-Pilar, Sorsogon route, the financial analysis for Cataingan, Masbate-Bogo, Cebu route is made under the same assumptions as stated in the previous section regarding the procurement method and other conditions. The start of RoRo service is also assumed in the mid-year 2008, taking into account the construction period of the two ports.

The following tariff rates for passengers and cargo are assumed. The tariff rate of passenger-cargo vessel currently operated between Cataingan, Masbate and Cebu City (90N.M.) was referred. The rate per mile for the pilot route is slightly higher than Cataingan, Masbate-Cebu City but lower than Pilar-Masbate, and the numerical value is still lower than Cataingan-Bogo (P360/pax and P400-600/ton). As for trucks, additional charge is also assumed.

- Passenger: P265/person (P5/person/mile)
- Cargo: P530/tonkg (P10/ton/mile)
- Trucks (loading capacity: 8 ton): 3,000 Pesos/truck

The operation of new RoRo vessel is summarized in the table below. It is assumed that one vessel will operate only one round trip per day or 338 round trips per year.

Table 11.6.22. RoRo Vessel Operation (Cataingan-Bogo)

Route Distance (N.M.)	53
Speed (knot)	12
Round Trip Hours (including port time)	10.8
Operating hours/day	16
Number of round trips/day	1
Commissionable days	338
Total round trips/year	338

2) Financial Indicators by Procurement Method

As a result of the cash flow analysis, the financial indicators are obtained as shown in table below. The FIRR of the new RoRo operation is estimated to be more or less favorable at 13.0%. The ROE is high at 19.4% in the case of NMEC lease-purchase and 15.7% in the case of JBIC sub-loan. Therefore, the operation of new RoRo vessel in the Cataingan-Bogo route is financially feasible and profitable for the operator if NMEC lease-purchase or JBIC sub-loan is employed.

Table 11.6.23.Financial indicators by Procurement Method (Cataingan-Bogo)

Indicators	Comm. Loan	JBIC sub-loan	NMEC Lease
FIRR	13.0%		
ROE	4.2%	15.7%	19.4%

Cash flow of the new RoRo vessel operation including revenues, expenditures and other financial parameters is shown in Table 11.6.24.

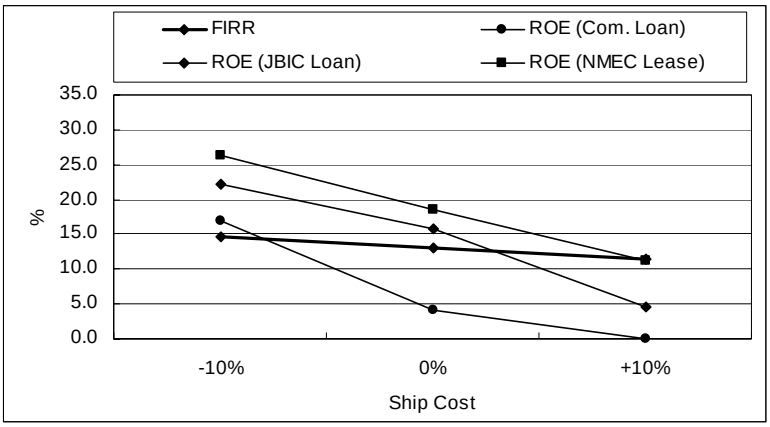
3) Sensitivity Analysis

Although newly built RoRo vessels will be profitable under the assumed conditions, the sensitivity analysis is undertaken from the financial viewpoint.

a. Vessel Procurement Cost: The sensitivity of vessel procurement cost to the

financial indicators is examined as shown in Figure 11.6.3. Obviously the financial indicators will be significantly improved if the cost is decreased. On the other hand, FIRR and ROE will be lower but still favorable level under condition of NMEC lease-purchase method even if procurement cost is increased.

Figure 11.6.3. Sensitivity of Vessel Procurement Cost (Cataingan-Bogo)



b. Freight Rate: The sensitivity of freight rate to the financial indicators is examined as shown in Figure 11.6.4. The financial indicators will be improved significantly when the freight rate is increased. On the other hand, the operation of new RoRo vessel will not be profitable when freight rate is reduced even if NMEC lease-purchase method is applied.

Figure 11.6.4. Sensitivity of Freight Rate (Cataingan-Bogo)

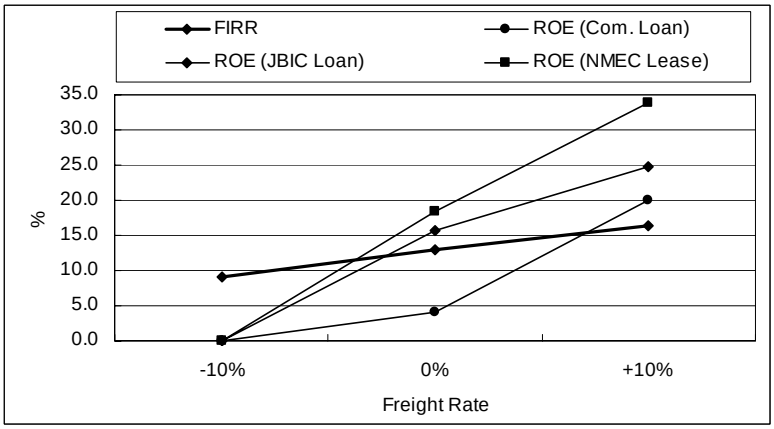


Table 11.6.24. Cash Flow of New RoRo Vessel Operation (Cataingan-Bogo, NMEC Case)

PROFIT LOSS STATEMENT			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1.OPERATING REVENUE		0	40	80	80	81	82	82	83	84	86	89	93	98	103	109	116	122	129	136
1)Tariff REVENUE		0	40	80	80	80	81	81	81	82	85	88	91	94	97	102	106	110	115	120
2)INTEREST			0	0	0	0	1	1	2	2	2	2	2	4	6	8	10	12	14	16
2.OPERATING EXPENSE																				
1)OPERATING COST		0	17	35	37	39	41	43	45	48	50	53	56	59	62	65	69	73	77	81
2)DEPRECIATION		0	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	0	0	0
3.OPERATING PROFIT		0	8	29	28	26	24	22	21	19	19	19	20	20	20	21	21	38	39	40
4.OTHER EXPENSES	0	0	35	36	35	34	34	34	34	34	34	34	0	0	0	0	0	0	0	0
1)FINANCIAL COST																				
-LEASE COST	0	0	34	34	34	34	34	34	34	34	34	34	0	0	0	0	0	0	0	0
-INTEREST FOR SHORT TERM			0	1	0.3	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
2)SALES TAX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.NET PROFIT BEFORE TAX	0	0	-27	-6	-7	-9	-10	-12	-14	-15	-15	-15	20	20	20	21	21	38	39	40
6.INCOME TAX	0	0	0	0	0	0	0	0	0	0	0	0	6	6	6	7	7	12	12	13
7.NET PROFIT AFTER TAX	0	0	-27	-6	-7	-9	-10	-12	-14	-15	-15	-15	13	13	14	14	15	26	26	27
8.DIVIDENTS																				
9.RETAINED EARNINGS	0	0	-27	-6	-7	-9	-10	-12	-14	-15	-15	-15	13	13	14	14	15	26	26	27

CASH FLOW STATEMENT			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1.SOURCE OF FUNDS	7	17	0	12	8	7	5	4	2	0	0	1	35	35	35	36	37	38	39	40
1)NET PROFIT BEFORE TAX	0	0	-27	-6	-7	-9	-10	-12	-14	-15	-15	-15	20	20	20	21	21	38	39	40
2)DEPRECIATION	0	0	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	0	0	0
3)SHORT TERM LOAN	0	0	12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4)OWN FUND (EQUITY)	7	17	0																	
5)LONG TERM LOAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.APPLICATION OF FUNDS	7	17	0	12	3	0	0	0	0	0	0	0	6	6	6	7	7	12	12	13
1)DEPOSIT	7	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2)REPAYMENT OF SHORT LOAN	0	0	0	12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3)REPAYMENT OF LONG LOAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4)INCOME TAX			0	0	0	0	0	0	0	0	0	0	6	6	6	7	7	12	12	13
5)DIVIDENTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.CASH SURPLUS(SINGLE YR)	0	0	0	0	5	7	5	4	2	0	0	1	29	29	29	30	30	26	26	27
4.CASH SURPLUS(ACCUML.)	0	0	0	0	6	13	18	21	23	23	24	24	53	82	111	140	171	196	223	249

11.6.3 Preliminary Environmental Analysis

A preliminary environmental condition survey was conducted at the proposed project sites during the conduct of field surveys. The findings gathered, which will be taken into consideration during the planning and implementation stage of the project, are presented below.

(1) PILAR PORT

- Environmental setting is still rural with major activities concentrated at the port and at the town's commercial center. Oil spillages from the vessels are still minimal but are expected to arise due to the increasing number of vessels using the port. Solid waste disposal was seen at the premises of the port, due to the presence of commercial establishments inside the port.
- Access road going to the port is narrow and it passes through the town proper and the commercial center. To avoid traffic congestion, the LGU - Pilar imposes a one-way traffic scheme. The proposed port and public market development of Pilar, which will be implemented by the LGU on the first quarter of 2006, provides a new coastal road from the National Highway leading to the port.
- Pilar Bay, where the port is located has many commercial fish pens. The bay is likewise silted due to the presence of a major river, with run-offs directly dumped at the bay. Proper planning on the design and location of the additional port facilities shall take into consideration to tackle these issues.
- The municipality of Pilar is prone to typhoons. Passenger terminal building shall provide enough area to accommodate stranded passengers when trips are cancelled during typhoons.

(2) MASBATE PORT

- The environment of Masbate Port is urban, being a commercial port located in the city proper. Solid waste disposal was seen at the port vicinity, due to the presence of commercial establishments outside the port premises. Proper planning on the mitigation of solid wastes must be considered in the planning stage of the project.
- There are enough port facilities and parking/back-up space for RoRo operations at the port, however there is no separate access of passengers going to and from the vessels from/during embarking and disembarking which pose danger to the passengers.
- Oil spillage and heavy metals (lead, cadmium and copper) are expected in the coastal waters of the Masbate Port, being a commercially operating port.

(3) CALUMPANG PORT

- The environment of Masbate Port is urban, being a commercial port located in the city proper. Solid waste disposal was seen at the port vicinity, due to the presence of commercial establishments outside the port premises. Proper planning on the mitigation of solid wastes must be considered in the planning stage of the project.
- The environment setting in Calumpang in the municipality of Balud, Masbate is rural with little traffic and very minimal pollution to the environment. The condition of the 21-km from Balud town proper to the Calumpang Port is very poor, consisting of earth and gravel. There are no mangroves nor houses or other structures near the port.

(4) ROXAS PORT

- Banica Port – The existing Banica Port located about 4 kilometers from the Roxas City proper is very shallow and is located on a river which can accommodate only motorized pump boats and bancas. Access from the highway to the port is very narrow with no back-up and parking spaces.
- Culasi Port – Culasi Port in Culasi, Roxas City is a commercial port operated by PPA which has two (2) RoRo ramps. Access road is very good with ample spaces for parking and queuing of vehicles. Traffic going to and from the port is moderate.

(5) CATAINGAN PORT

- Environmental setting in Cataingan is still rural with little or no pollution on its surroundings. Oil spillage from the vessels is minimal caused by motorized bancas and one passenger vessel. Traffic to the port is low.

11.7 Conclusions and Recommendations

(1) CONCLUSIONS

1) Selection of the Port

In this study, three pilot project corridors were selected for the development of the Central Nautical Highway. Then, the specific ports which will be used for RoRo service for the three corridors were selected through pros/cons analysis and multi criteria scoring based on the field survey conducted. They are:

- Bicol-Masbate Corridor: Pilar Port and Masbate City Port
- Masbate-Cebu Corridor: Cataingan Port and Bogo Port
- Masbate-Panay Corridor: Balud Port and Roxas Port

These selected ports are different from the ports in the missionary routes network identified by DBP. However, the selected ports are considered as the best proposal because the selection is based on detailed surveys and analysis of the existing local conditions. Therefore, in considering for other corridors, it is recommended that local conditions of the area shall be further studied comprehensively as it was examined in this Study, since there are many alternative ports to connect the corridor by RoRo vessels.

2) Economic Effect of the Development of RRTS in RoRo Missionary Routes

Economic viability of each pilot project was examined in based ondevelopment cost for ports, RoRo vessels and access road and development benefits of RRTS such as savings of transport cost and travel time and reduction of maritime accidents compared to the existing services such as banca boat, etc.

In general, introduction of RoRo vessel is faster and safer than banca boat. Therefore, it has large benefit to the national economy. In addition, it was found that the running cost of banca boats is very high, while fixed cost of operating cost and other costs are very low compared to RoRo vessel. In all, RoRo vessel induces large benefit in terms of transport cost savings, viz-a-viz banca.

As the results of the economic analysis, the pilot projects for the routes of Pilar-Masbate and Cataingan-Bogo showed sufficient level of EIRR of more than 15% even if new RoRo vessel is introduced. These two pilot projects will be feasible from the viewpoint of national economy. On the other hand, the RoRo

operation in Balud-Roxas City is not viable from the standpoint of national economy because the project cost is very high compared to the benefit due to low demand on this route at this moment.

Although the introduction of second hand RoRo vessels has higher EIRR than the new RoRo Vessels, new RoRo vessel operation is still economically viable. In considering the shortage of second hand RoRo vessel supplied from Japan and strengthening of local shipbuilding and repairing industry which is proposed in DSDP as one of the major domestic shipping development policy directions, new construction of RoRo vessel by local shipyards could be clearly rationalized for further RRTS development

3) Financial Viability of New RoRo Vessel through NMEC Lease-Purchase Method

The financial analysis was made for new RoRo vessel operation in two pilot project routes of Pilar-Masbate and Cataingan-Bogo since Balud-Roxas City route was not economically feasible.

As a result, under the assumed conditions for the analysis, new RoRo vessel operations on two routes show more or less favorable level of FIRR (17.2% and 13.0%, respectively). The ROE under NMEC lease-purchase is also high enough (11.5% and 18.5%, respectively). Therefore, the operation of new RoRo vessel in the routes of Cataingan-Bogo and Pilar-Masbate is financially feasible and profitable for the operator if NMEC lease-purchase is employed.

RECOMMENDATIONS

1) Closer Coordination Between and Among the Concerned Agencies

Clearly, there is a big need for a synergistic approach for the development of the total Roll-on, Roll-off Transport System. The road networks must be developed to provide connections between and among the various RoRo ports; ports must be properly developed and constructed with both landside and waterside facilities to make a RoRo trip efficient and pleasant for the ship operators, shippers and passengers; and the right incentives and protection must be given to make RoRo operations along missionary routes a viable business venture. If done independently of one another, the benefits would be limited unlike if they are done as a program or synergistically.

Now that the ball has been transferred to the court of the DOTC as the designated leading agency for RRTS development. The agencies involved in RoRo transport have shown their dedication and passion in the launching of the SRNH. It is almost a given that they would provide the same to further expand the RoRo transport system. Another corridor has been identified for development, which is very much in line with the development objectives of the President.

2) National Government to Provide Funding for Nationwide RoRo Development

Port development projects have always been pursued based on their economic feasibility and social desirability. Very rarely, if ever, are domestic ports developed based on their financial viability. Based on the experience of the Project Management Office for Ports of DOTC, feeder ports are barely positive on their financial internal rate of return, some are even marginally passing on their economic internal rate of return. The second package of feeder ports was developed because it was in support of the Social Reform Agenda, hence the name Social Reform Related Feeder Ports Development Project.

Be that as it may, the development of a nationwide RoRo transport system is worth pursuing since it provides opportunities for improving transport efficiency between

our islands. In recognition of this, the President has identified the development of the Strong Republic Nautical Highway as part of her Ten-Point Agenda. However, the wherewithal to implement this program has been, and still is, wanting. This is mainly due to a very low budget allocation to water transport development in the DOTC budget.

The Study Team recommends that the Philippine Government consider the following options to put the development of the RoRo system apace with the economic development of the country:

- Allocate a specific amount in the DOTC Annual Infrastructure Budget for RoRo ports development for the next five years.
- Instruct the Philippine Ports Authority to come up with a five-year RoRo Port Development Program. This Program shall be coordinated with the DOTC and MARINA.

3) Assistance for the Selection of Port Sites within the Prioritized Routes

The JICA Port Development Master Plan along with a number of other studies have identified and prioritized RoRo routes for development. However, as shown in this mini-FS for RRTS Pilot Project, there is a need to verify on the ground these identified ports.

It is informed that DOTC has applied for a JICA grant for the further studies of the identified ports for mobility enhancement to move forward their development into final fruition. This would be a step in the right direction to give impetus to RoRo development in the country.

It is recommended that the proposed JICA study should not be constrained into just the identified ports in the Master Plan. As mentioned in the introduction of this mini-FS, there are ports identified in the Master Plan that are not really suited for RoRo development for one reason or another. There are also other RoRo connections that can be considered, like the connection for the island province of Catanduanes, etc. It is also recommended that the proposed JICA study be guided by the principle that the RoRo ports would be connecting economic centers and not just two municipalities; therefore, said study should look deeper into the proposed port sites with the objective of finding the optimum link for the economic centers to be served.

The Study Team recommends further that the proposed JICA study not only limit the scope on port development but should also look into the route feasibility for a more holistic approach on RoRo development.

4) Development of Missionary Routes through the Overall Development of the Total Domestic Shipping Sub-Sector

The Government has the social responsibility to facilitate the movement of people and goods, as this promotes equitable distribution of economic activities and opportunities, national integration and unity, and assures accessibility to basic social services.

Because of the low level of traffic and highly seasonal characteristic of the routes, only small wooden-hulled vessels and bancas can offer sustainable operations on numerous routes. These types of vessels, however, are highly vulnerable to maritime accidents and offer little assurance of safety during inclement weather.

The Government, through the MARINA, has long been pushing for the

modernization of domestic shipping. With DSMP I funds from JBIC, and managed by DBP, quite a number of vessels of varying types and sizes were procured to improve domestic shipping services, although most of these vessels were deployed in the profitable primary and secondary routes. With DSMP II funds, DBP wants to focus on the development of missionary routes, which in itself is a noble objective. However, the Study Team takes the position that this can be done not by limiting the loans for vessels to be deployed on missionary routes only. The Study Team recommends that the development of missionary routes be done as a consequence of the overall improvement of the total domestic shipping sub-sector, and not as the direct and single objective only.

A lesson can be gleaned from the development of worldwide container shipping. No new vessels are designed or built to serve feeder container routes. Rather, new designs and new buildings are for the high-traffic, highly competitive round-the-world container services. Whatever vessels are displaced by the new, more efficient container vessels are deployed in the lower hierarchy of container services, and so on and so forth. The effects of deploying new and more efficient container vessels in the highest hierarchy of container shipping trickles down to the lowest hierarchy.

The same principle can be applied in domestic shipping. Vessel financing should be made available to those needing said assistance. A new vessel will invariably displace an existing vessel in its current route, which would then be deployed in a lower hierarchy of the domestic shipping route structure. Eventually, a vessel would end up being deployed in a missionary route or sold at a cheap price which could be operated in a sustainable manner in a missionary route.

5) Promotion of Standardized and Serial Shipbuilding for Short-distance RoRo Vessels

According to the DSDP Framework, the existing short-distance RoRo fleet (defined as that of less than 1,500GT) is composed of 81 vessels. Until the year 2015, 78 vessels will be procured to meet demand including replacement and addition. If the Government decides to extend numerous missionary routes on the domestic waters, fleet expansion must be accelerated.

RA 9295 shows a clear policy to develop domestic shipbuilding capability with financial incentives and a restriction/limitation measure on vessel importation from small size (i.e., starting from vessels of less than 500GT). With implementing this policy, most of RoRo vessels will be delivered from domestic shipyards.

The small FS on RRTS selected three routes. The results show that two routes are economically feasible but one is not, at least for coming several years due to a low demand nature. In the case of new ship assignment, financial viability is not high for the remaining two routes. Therefore it is necessary to construct an economical and qualified vessel for a RoRo operator. However it is quite difficult when ship is built on an individual order basis. Therefore the government intervention (MARINA and public financial institutions) must come in to build many standardized vessels at capable domestic shipyards in the most economical way. This program should be designed with some flexibility for RoRo operators in selecting their favorable financing services like loan or lease, and assigning brand-new vessels on busy and lucrative routes as explained above.

12. Development of Bulk Shipping and Corn Logistics System

12. DEVELOPMENT OF BULK SHIPPING AND CORN LOGISTICS SYSTEM

12.1 Background and Objectives

Considering the current imbalance of supply and demand of yellow corn, improvement of transportation from Mindanao to Luzon is a topic often discussed and studied but has not been implemented. One of the reasons for the difficulty to improve the logistics chain of yellow corn is the difficulty of organizing the activities of different stakeholders such as farmer, post harvest processor, local assembler, provincial trader, truck operator, shipping company, milling company, and animal raisers.

The primary purpose of the study is to propose an improvement of shipping sector with possible development scheme of the logistics chain of yellow corn from Mindanao to Luzon. Even though the main focus of the study is transportation of corn by bulk vessel, equal effort has been exerted to the study of producers, traders, warehousing and cargo handling operators because efficient logistics would benefit both farmers and traders in the corn industry. The objectives of the study are in the following points.

(1) Analyze key issues in realization of bulk shipping in the transportation of corn;
(2) Analyze key components of post-harvest facilities and investment on logistics system;
(3) To establish a possible development scheme of logistics system including bulk shipping;
(4) To evaluate development schemes from the viewpoint of both total system and individual components; and,
(5) To identify possible management bodies for the development scheme.

12.2 Scope of Study

Including bulk shipping as the key topic, total structure of corn logistics from Mindanao to Luzon will be studied for its possible development. In this respect, the study extends from production of corn, post harvest facilities and transportation to customers will be covered. Improvement schemes will be proposed and examined from the aspects of technical, financial and social acceptance.

The results of the study were presented through a workshop of the different stakeholders. Presentations regarding the scope of the study were made. The workshop was held on July 28, 2005. The summary of the said workshop is presented in the Appendix 7.2.

12.3 Present Situation of Corn Industry

12.3.1 National Agriculture Performances

Corn is an important crop next to rice in the Philippines. It has multifarious uses ranging from human food, animal feed, packaging materials, liquor, etc. As a staple food, about 20% of Filipinos depend on corn, especially in some parts of the Visayas area.

The performance of Philippine agriculture for 2004 has recorded an increased output of the crops subsector. In particular, there was an improvement in corn production, which grew by 17.27% compared to the previous year. The increase in corn output

was more than double that recorded for 2003 (growth of 6.86%). Total corn production for 2004 reached 5.41 million metric tons. The hefty output can be attributed to the expansion of harvest areas, improved level of productivity, availability of quality seeds, and better market price[1].

On the regional scene, only a few regions stand out as the main production areas. Only one region in Luzon stands as the highest production area while there are three in Mindanao. These are Regions X, XII and ARMM in Mindanao.

Table 12.3.1. Production of Corn by Region (in MT)

Area	2000	2001	2002	2003	2004	AAGR (%)
Philippines	**4,511,070**	**4,525,012**	**4,319,262**	**4,616,425**	**5,413,386**	**4.00**
Metro Manila	0	0	0	0	0	0.00
CAR	72,415	93,552	93,611	84,162	106,282	9.35
Region 1 (Ilocos)	173,448	182,666	182,061	196,679	223,855	5.81
Region II (Cagayan Valley)	951,904	907,177	832,411	824,053	1,198,394	5.18
Region III (Central Luzon)	77,298	114,065	122,546	143,819	147,230	18.09
Region IV-A (CALABARZON)	41,308	42,297	41,309	42,772	53,034	5.68
Region IV-B (MIMAROPA)	56,526	58,755	62,005	59,359	67,564	3.91
Region V (Bicol)	62,787	62,842	73,963	66,961	81,285	5.89
Region VI (Western Visayas)	80,304	75,540	87,065	128,728	138,205	14.42
Region VII (Central Visayas)	137,536	154,011	166,960	192,061	183,995	6.76
Region VIII (Eastern Visayas)	46,306	47,525	49,651	51,835	59,906	5.87
Region IX (Zamboanga)	123,233	134,309	135,072	176,287	199,631	12.40
Region X (Northern Mindanao)	777,828	798,733	701,211	817,182	927,689	3.85
Region XI (Davao)	151,307	148,406	181,947	214,344	247,781	12.75
Region XII (SOCCSKSARGEN)	990,300	919,042	885,055	870,124	1,025,312	0.71
CARAGA	70,959	67,747	68,043	74,545	95,260	6.85
ARMM	697,611	718,345	636,352	673,514	657,963	-1.14

Source: Bureau of Agricultural Statistics (BAS), 2005

Estimates by the Department of Agriculture on the national supply and use of corn in its varied forms from 1994 to 2001 show a close to self-sufficiency level on a yearly basis in terms of production and requirements for food, feeds and seeds. But still there is need to import an average of about 1 million MT per year. This could be due to the fluctuation/ inconsistency in supply during a given year, wastage and the poor market linkage of production to consumption areas. In addition to this, the livestock industry is the single most important industry that affects the requirement for corn as shown in the table below.

Table 12.3.2. Estimated Supply and Use of Corn in the Philippines (1994 to 2001)

Item	1994	1995	1996	1997	1998	1999	2000	2001
SUPPLY	5,371	5,196	5,437	5,704	5,832	5,573	5,699	5,800
Beginning Stock 1/	204	217	190	260	323	471	238	190
Production	4,520	4,128	4,151	4,332	3,823	4,585	4,511	4,525
Imports (corn & corn subts.2/)	647	851	1,096	1,112	1,686	517	950	1,085
REQUIREMENTS								
Food	958	735	731	756	834	885	907	943
Seeds	60	54	55	55	49	53	50	50
Feeds	3,044	3,254	3,457	3,631	3,681	3,480	3,650	3,725
Wastes & Others	1,092	963	934	939	797	917	902	905
ENDING STOCK	217	190	260	323	471	238	190	177
Estimated per Capita/year (kg)	14.3	10.8	10.5	10.6	11.4	11.8	11.8	12.0

Source: GMA Corn Program, DA, 2005

Note: 1/ Excludes stocks held by commercial livestock and poultry raisers as well as corn mixed in feeds.
2/ Assumed wheat imports as well as local corn substitute used as feeds

[1] As reported in the Philippine Department of Agriculture – Performance of Philippine Agriculture, January – December 2004.

12.3.2 Corn Production, Utilization, and Logistics in Southern Philippines

(1) CORN PRODUCTION AND UTILIZATION

In Southern Philippines, there are six corn producing regions. These are: (1) Zamboanga Peninsula or Region IX; (2) Northern Mindanao or Region X; (3) Davao or Region XI; (4) SOCCSKSARGEN or Region XII; (5) CARAGA; and (6) ARMM. SOCCSKSARGEN or Region XII leads in terms of output volume in recent years accounting for about 84% of total production of southern Philippines as of 2004.

Region XII is composed of the provinces of South Cotabato, North Cotabato, Sultan Kudarat, Sarangani, and the independent city of General Santos City (otherwise referred to as SOCCSKSARGEN). With the recent realignment of provinces for the region, what used to be a single corn belt province now became a two corn belt provinces (i.e., South Cotabato and Sultan Kudarat) of the region, thus intensify the position of the region in the corn industry[2].

However, in terms of the flow of commodity of the provinces of the region, there are two distinct directions for corn. The excess of corn production[3] of North Cotabato find their way to markets in Davao. On the other hand, most of the production from South Cotabato, Sultan Kudarat and Sarangani find their way to General Santos City. From here, corn are either consumed by other industries (hog raisers, poultry growers, feedmills, etc) or shipped out by traders to the Visayas or the Luzon areas through Makar port of General Santos City. Visayas is the major consumer of white corn, which is used for human consumption. Luzon, on the other hand, is the consumer for yellow corn for animal feeds.

Table 12.3.3. Yellow Corn Production in Region XII 1/ (in metric tons)

Yellow Corn

Area	2000	2001	2002	2003	2004	AAGR (%)
Gen. Santos City	9,746	17,120	12,520	10,870	14,466	9.69
Sarangani	108,085	122,405	147,523	54,960	135,060	4.99
South Cotabato	313,186	350,367	423,552	356,555	314,370	0.08
Sultan Kudarat	229,968	205,658	198,255	229,220	267,133	3.23
Total	660,985	695,550	781,850	651,605	731,029	2.12

White Corn

Area	2000	2001	2002	2003	2004	AAGR (%)
Gen. Santos City	2,088	3,813	1,834	1,362	2,615	5.05
Sarangani	22,090	10,772	15,318	26,583	40,534	16.70
South Cotabato	136,513	148,254	160,583	173,628	172,701	5.30
Sultan Kudarat	54,752	98,438	110,518	52,160	171,429	42.62
Total	215,443	261,277	288,253	253,733	387,279	15.95

Total Production

Area	2000	2001	2002	2003	2004	AAGR (%)
Gen. Santos City	11,664	20,833	14,354	12,232	14,466	4.80
Sarangani	130,175	133,177	162,640	81,543	175,594	6.98
South Cotabato	449,699	498,621	584,135	530,183	487,071	1.66
Sultan Kudarat	284,720	304,096	308,773	281,380	438,562	10.81
Total	876,258	956,727	1,069,902	905,338	1,115,693	5.46

Source: Provincial Agriculturist Office of each province and the City Agriculturist Office of General
Note: 1/ except North Cotabato

[2] South Cotabato used to be part of Region XI. The realignment of provinces for Region XII brought both Sultan Kudarat and South Cotabato

[3] Less the internally consumed corn volume by human and animals (in the form of feeds).

Table 12.3.4. Yellow Corn Area in Region XII (in hectares)

Yellow Corn

Area	2000	2001	2002	2003	2004	AAGR (%)
Gen. Santos City	5,572	6,246	4,309	5,310	4,171	-5.03
Sarangani	10,622	16,527	17,563	11,141	19,114	15.99
South Cotabato	36,104	38,632	46,962	44,117	37,759	0.92
Sultan Kudarat	29,048	25,476	22,850	28,638	33,752	3.24
Total	81,346	86,881	91,684	89,205	94,795	3.31

White Corn

Area	2000	2001	2002	2003	2004	AAGR (%)
Gen. Santos City	1,234	2,908	1,390	1,998	1,318	1.36
Sarangani	5,811	1,937	2,128	8,857	10,473	16.05
South Cotabato	21,019	21,880	24,814	29,935	29,820	8.38
Sultan Kudarat	7,619	14,402	15,983	8,150	27,976	53.44
Total	35,683	41,126	44,315	48,940	69,587	19.00

Total Land Area

Area	2000	2001	2002	2003	2004	AAGR (%)
Gen. Santos City	6,224	9,211	6,436	5,578	6,776	1.77
Sarangani	16,433	18,464	19,691	19,998	29,587	16.01
South Cotabato	57,122	60,512	71,776	74,052	67,579	3.66
Sultan Kudarat	36,667	39,878	38,833	36,788	61,727	13.67
Total	116,446	128,065	136,735	136,415	165,669	8.45

Source: Provincial Agriculturist Office of each province and the City Agriculturist Office of General Santos City

* except North Cotabato

On the provincial level, the two strong producing areas in SOCSKSARGEN[4] are the provinces of South Cotabato and Sultan Kudarat (see Table 12.3.5 and Figure 12.3.1). The aggregate volumes reflected by the provincial agriculturists are actual production, which are slightly higher than that recorded in the Bureau of Agricultural Statistics (BAS). Based on the past 5 years' performance (2000 – 2004), total production has grown by an annual average growth rate of 5.5% and total corn land has expanded at an average annual rate of 8.5%. This indicates that there is a slow increase in the volume of production despite the larger increase in land utilized. Moreover, there is not much improvement in the unit productivity of the land reflecting the effort of national government and the local government units (LGUs) to improve the corn industry. The programs of the national government and LGUs are discussed in a succeeding section.

As for corn utilization, Region XI has the highest at 217,124 MT annually for its ten feed milling plants. This is followed by Region XII with 186,827 MT and Region X with 139,549 MT.

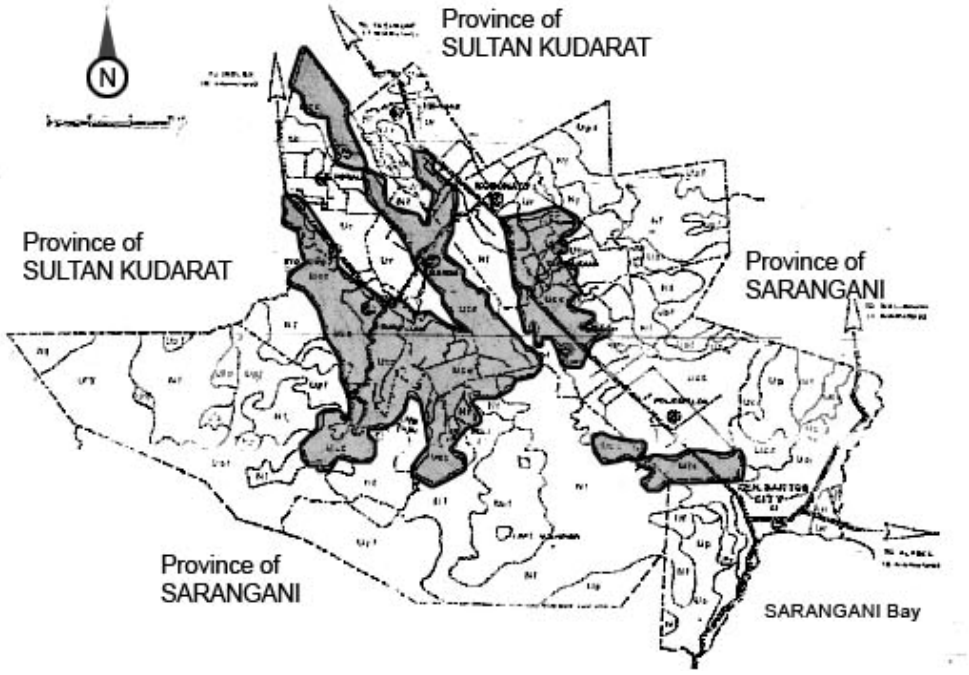
Table 12.3.5. Corn Utilization of Feedmills and Processors in Mindanao, 2004

Region	No. of Feedmills/ Processing Plants	Volume of Corn Used (MT)	Utilization Rate of Total Regional Volume (%)
Region IX	11 FM	23,048	11.55
Region X	10 FM; 5 P	139,549	15.04
Region XI	10 FM	217,124	87.63
Region XII	13 FM	186,827	18.22
Total	44 FM; 5 P	566,648	23.61

Source: DA Corn Road Map for Southern Philippines (2005-2010)

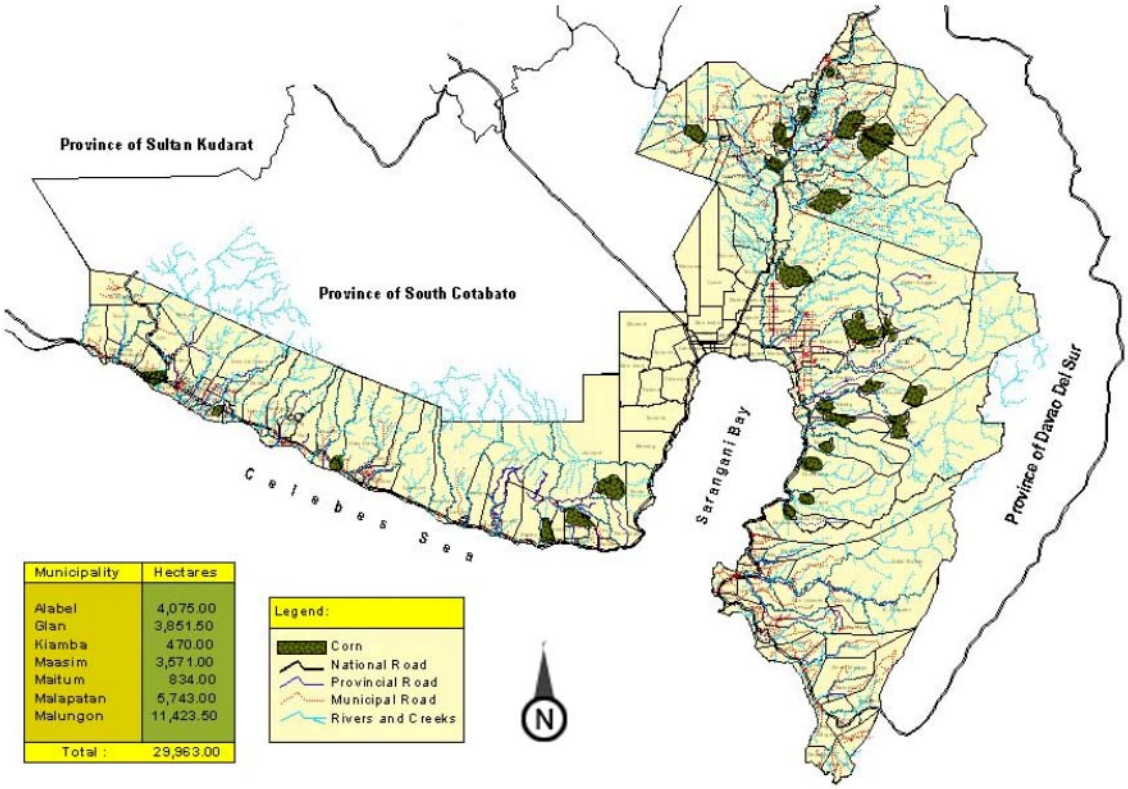
[4] Region XII less the province of North Cotabato.

Figure 12.3.1. Corn Land Area of South Cotabato



Source: Provincial Agriculture Office, South Cotabato.

Figure 12.3.2. Corn Land Area in Sarangani

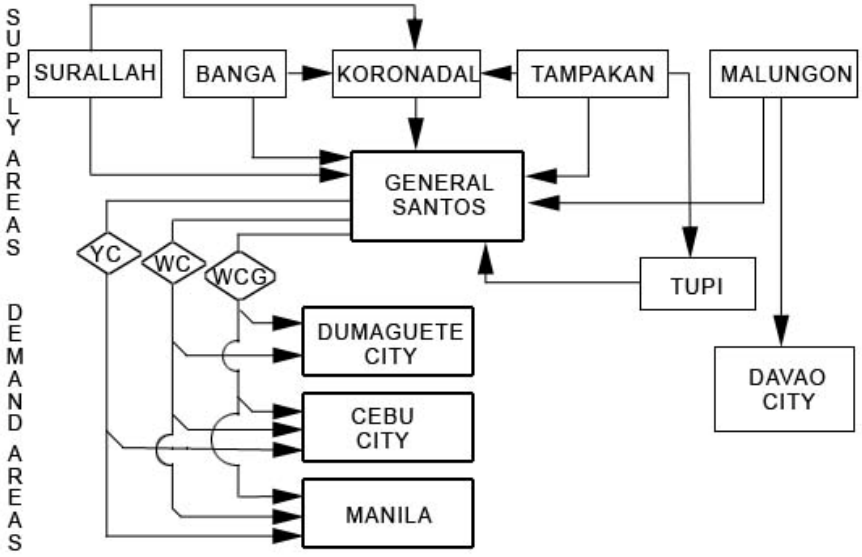


(2) CURRENT DISTRIBUTION OF CORN IN THE SOCSKSARGEN REGION

The flow of corn commodities through General Santos City was captured in a study done in 1993 for a Bulk Handling and Shipping Study done by Asian Terminal, Inc. (ATI) with the cooperation of Southern Mindanao Federation of Agricultural Cooperatives, Inc. (SMFACI). To update the commodity flow would entail adding the volume of corn from Sultan Kudarat flowing to General Santos City, which was estimated to be 80% of total provincial production. About 40% of the total production of South Cotabato and 85% of Sarangani, on the other hand, flows out to General Santos City[5].

Previous studies showed that only about 21% of yellow corn reaching General Santos City is shipped out to Luzon and Visayas. But with the recent increase in livestock and poultry population as well as feed mills in the Mindanao area and the slow growth of corn production, these percentages are said to be now smaller. On the other hand, the share of white corn shipped to Visayas/Luzon are said to remain the same if not slightly higher than 61% for white corn grain and 28% for white corn grits.

Figure 12.3.3. Flow of Corn Commodities in Region XII



(3) CURRENT PRACTICE OF CORN TRANSPORTATION, STORAGE AND PROCESSING

The system for transporting, storing and processing corn has not changed since the time it was documented in 1987 by The Corn Marketing System: A Rapid Marketing Appraisal in the Southern Mindanao Region[6]. That is, corn is not handled and transported in bulk. The common practice for most farmers having not more than 5 hectares is as follows:

- On the field, corns in sacks[7] are brought to the piling area either on foot or with the use of a carabao-drawn sled. Corn are either maintained in sacks or shelled on field using rented portable shelling equipment. From the piling area, sacks are loaded on carabao-drawn sled, pick ups, small trucks, etc., and brought to the shelling/drying area.
- In the solar drying area, corn is dried for about 3 days. Paid manual labor is used to

[5] Based on information from the Office of the Provincial Agriculturist of the 3 provinces.

[6] A joint undertaking by the Philippine Chamber of Commerce and Industry, the DA, and the USAID.

[7] Sizes of sacks vary depending on the discretion of the farmers. Sizes range from 35kg to 100 kg sacks.

open out the sacks daily to spread corn on the pavement, shift it around and return them in the sacks. Additional sacks are purchased to replace those that deteriorate during handling. For farmers that have access to mechanical dryers, a certain fee is paid for a one day drying service. The fee can range from P0.50/kg to P1.00/kg based on wet corn weight[8]. Target moisture level of the end product is 14%.

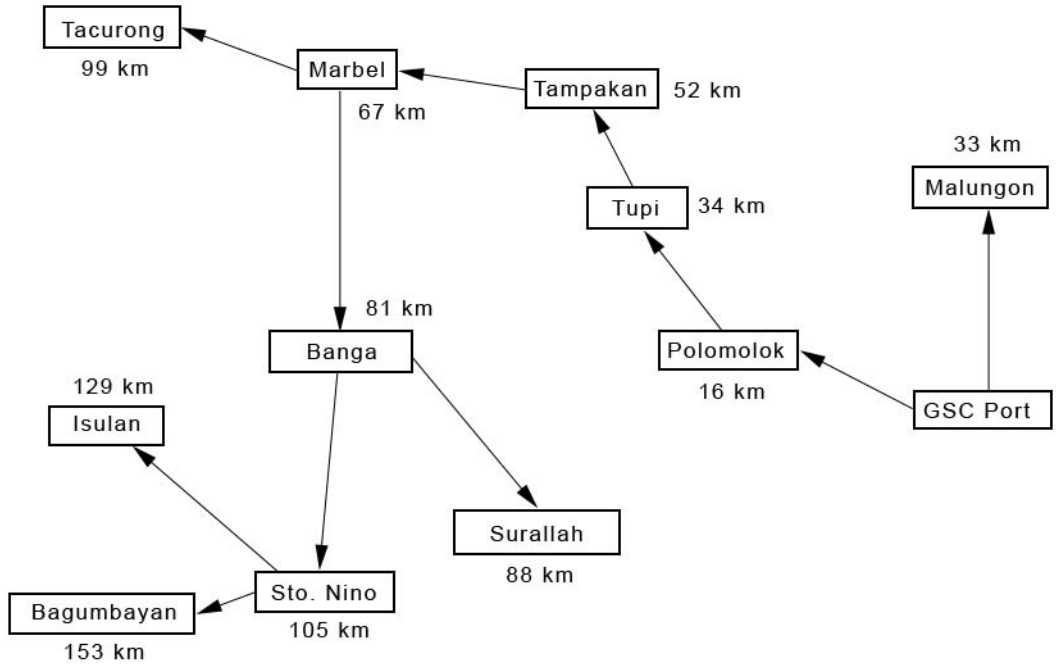
- Transporting the corn to the market or end user is usually done by the trader and in various ways. From fields near the roadside, trucks are used to haul sacks of corn grains. For farms that are interior or off the roadways, carabao sleds are used to bring it to accessible areas.

Farmers that are members of active cooperatives do have access to mechanization depending on the capacity of the organization. There is a medium-sized active cooperative in the major corn belt area of Sultan Kudarat.

As the concern for this study is large volume storing, only large traders and hog raisers have the capacity for long term storing of corn and other commodities depending on their needs for working capital and speculation practices. The smaller traders seldom have sufficient working capital for long term storage. Most storage of large scale amounts of grain for commercial purposes would be for a month or two.

The distances of the corn producing areas in the region to the port of General Santos City are shown in the following figure. Farm areas near the port such as Polomolok and Tupi are within 50 kms and other major regional centers such as Tampakan, Marbel, Tacurong, Banga and Surallah are between 100 and 250 km from the port. These cities function as corn assembler's hubs from where provincial traders buy corn grains and bring to their own silos/warehouse.

Figure 12.3.4. Distance of Production Areas from General Santos City Port



[8] Rates for biomass-fueled dryers are cheaper than diesel-fueled dryers.

12.3.3 Government Support for the Corn Industry

(1) NATIONAL GOVERNMENT POLICIES

National government's program and projects for the improvement of the corn industry has always been around but the strength of implementation has been varied. On the whole, most farmers in the area perceive the support as lacking. Recently, the government has formulated the GMA (Ginintuang Masaganang Ani) Corn Program[9]. It is the banner program of the Department of Agriculture (DA) in order to actualize the Agriculture and Fisheries Modernization Act (AFMA). It has several program components, which include: (a) production support services; (b) R&D; (c) infrastructure support; (d) rural finance; (e) marketing support services; (f) training extension; and (g) program organization and management (see Appendix 7) for a description of the program.

However, the implementation of the well meaning GMA Corn Program of the DA is hampered by fiscal constraints. Government could only provide the Miscellaneous and Operating Expenses of the program[10]. Based on interviews with the corn coordinators of the three provinces, the support given by the national government to the farmers under this program is implemented through several administrative layers; the DA, the provincial governments, the city/municipal governments and the barangays. However, the original scale of the support is made weak due to restrictions of funds in all layers. The following government support was noted:

(1) The GMA Corn Program through the DA regional offices;

(2) Limited distribution of seeds and pesticides from the provincial governments;

(3) Limited technical assistance from the provincial and municipal governments; and

(4) Identification of cooperatives or individual farmers by the barangays.

The Philippine agriculture sector has contributed 19-21% to the gross domestic product in recent years yet its share in the total public expenditures has never reached 5% for the last decade. As reported by the Bureau of Agricultural Statistics (BAS): "During the period 2000 to 2002, the share of agriculture in the total government expenditures ranged from 3.83% to 4.38%. The lowest was recorded in 2002 when agricultural expenditures amounted to only PhP29.42 billion which was 5.1% lower than the previous year."

Not surprisingly, the inadequate budget for agricultural development limited the expansion of vital agricultural services such as irrigation support (increasing by a mere 0.06% from 2001 to 2002) and agricultural production loans. As the BAS noted, "Credit support in agriculture has not expanded. From 1.1% in 2001, the ratio of agricultural loans to total loans granted even contracted to 1.0 percent in 2002."[11]

The DA has recently formulated the Corn Road Map for Southern Philippines: 2005 to 2010. It sites specific objectives to fulfill its mission of self sufficiency, competitiveness and best price as follows:

(1) At 7% annual growth in production to attain national self sufficiency;

(2) Reduce production costs by P1.50/kg;

[9] The GMA Corn Program gives priority to the establishment and development of farm clusters in prime corn lands. One typical farm cluster involves small farmholders and cooperatives within at least 400 hectares of contiguous corn lands with a cropping intensity of 200%.

[10] Preserving and Developing the Corn Sector, Roderico Bioco, Phil. Maize Federation, Inc., 2004

[11] Philippine Agriculture: Two Decades of Slow Growth by Research Staff, Philippine Peasant Institute, 2003

(3) Reduce logistics costs by P0.50/kg; and

(4) Increase farmer's income by 10% annually.

The following approaches are to be employed by DA to meet the stated objectives:

1) Grains Highway Program

The GMA Corn Program adopted the Grains Highway Program. Through construction of more post harvest and storage facilities in major corn producing areas and bulk handling in ports involved in corn transport, grain quality will be enhanced to the advantage of corn producer and end-user.

2) Expand Use of High Yield Corn Seeds

The use of high yielding corn seeds (i.e., hybrid corn seeds and OPV) to replace traditional varieties will improve farmers production and income. This would aim to increase yield from 4 MT/ha to 5MT or 6MT/ha. Additionally, there is need to increase the hybrid planted area by 50%.

3) Introduce Cost-Reducing Technologies

This includes cost-reducing technologies such as zero tillage, Tipid-Abono, Bio-N Mixing Plant, etc. that would lower the cost of corn production.

4) Access to Production Credit

Through accessible production credit, the optimum level of inputs will be applied resulting to higher productivity and lower production cost/kg of corn.

5) Intensify Farm Mechanization and Post Harvest Facilities Support

The DA will facilitate linkage of institutional Government Financial Institutions (i.e., Development Bank of the Philippines, Land Bank of the Philippines, local government units) and agricultural machineries companies with local corn farmers for procurement of farm tractors and implements such as planters, harrows, plows and cultivators. The DA will promote modern post-harvest technologies to reduce post harvest losses which accounts to about 10% to 12% of corn.

6) Link Producers directly with Industrial Users

The DA will initiate direct marketing and forward contracting between corn clusters, producers and corn processors, feed millers, livestock and poultry raisers to narrow the price gap between farm producers and feed millers.

7) Corn-Livestock Integration

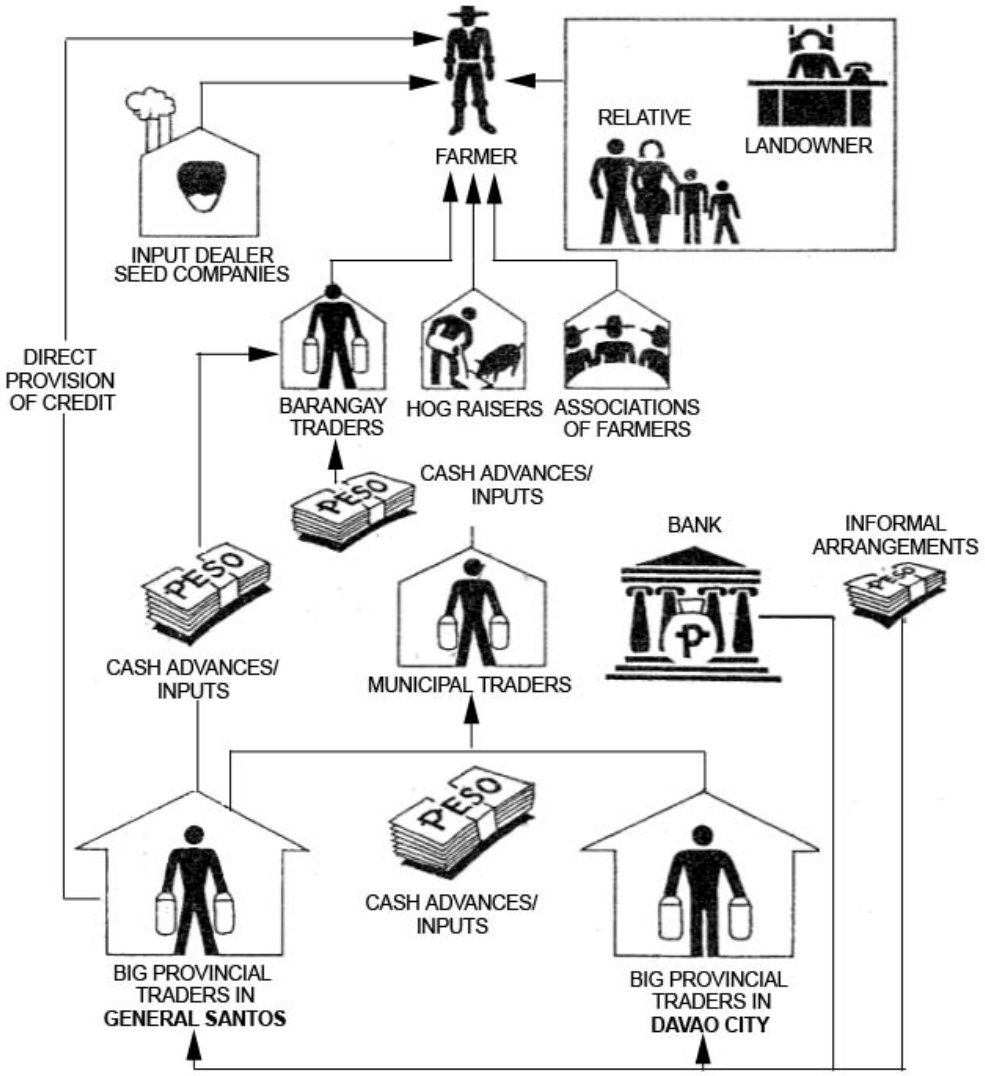
The program will encourage the establishment of the livestock industry to major corn producing areas like Bukidnon, General Santos City and South Cotabato for local consumptions or for delivery outside Mindanao.

(2) PRIVATE SECTOR

Assistance from the private sector are mostly in financing for seeds and fertilizer

during planting season, sustenance of the farmers' family while waiting for harvest after three months (in the form of cash advance), and cost to be incurred during harvest. However, this ties the farmer to the financier in that their produce are already committed at a price usually lower than prevailing market prices.

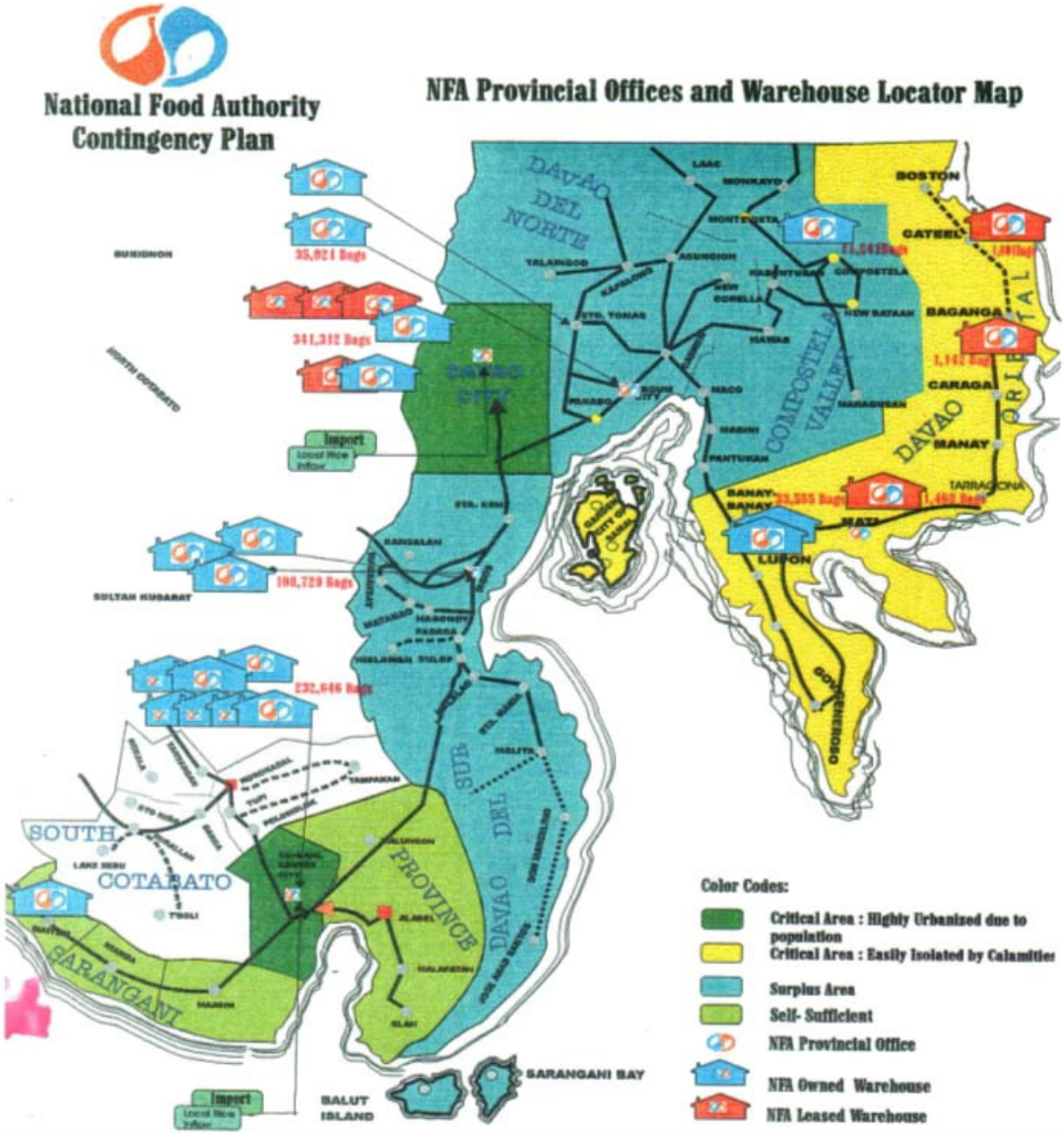
Figure 12.3.5. Financing Flow to Farmers



Further discussions on government and private stakeholders programs and directions are presented in the Appendix 7.

(3) POST HARVEST FACILITIES

Figure 12.3.6. Location of NFA Facilities in the Region



Source: NFA, 2005

The state enterprise responsible for the procurement and distribution governing the grains sub-sector is the National Food Authority (NFA). Corn procurement of most NFA offices in Region XII is idle due to reduced budgets for procurement. NFA is specifically mandated for rice grain but they also do procure corn. However, their price benchmark coupled with the inefficiency in their payment scheme proves to be unattractive to farmers. Most farmers prefer to go to traders for instant payment.

There are NFA facilities in the region that are tapped by the private sector and farmers' cooperatives for processing and storing of corn grains although they do not have the facility for bulk processing and storing. There are two of the larger ones on the provincial level and there are also strategically located but smaller facilities scattered in the region known as the farm level grains center providing farmers with solar drying space and small scale storage.

(4) ISSUES ON CORN SUPPLY IN REGION XII

Based on the interviews made with stakeholders from both the public and private sector, the following issues on the supply of corn in the region were stated:

1) Production of corn is not maximized

Many farmers own small plots of corn farms ranging from 1 to 4 hectares. The few bigger farms are more than 10 hectares. As such, farmers make independent decisions as to harvesting, processing, and marketing which affects the quantity and quality of corn. Due to their small scale and lack of access to better financing, they usually opt for the low risk production level. This entails shying away from the higher cost hybrid seeds which require more fertilizers. For farmers that use hybrid seeds, there is the under use of fertilizers (i.e., instead of 8-10 bags per ha only 4 bags are used). As such, yields are low at 4 MT per ha for the hybrid seeds and 2 MT per ha for the traditional variety.

2) Irregular flow of corn to markets

Due to the agro-climatic conditions of the area, most farmers plant and harvest at the same time with a cropping intensity of 2 to 2.5 per year. Thus, there is a distinct 2-peak periods of corn volumes. Peak production is during the months of July-August and November-December. The flooding of corn in the market at this time works against the farmers as prices tend to drop.

However, such practice of same-time planting is said to benefit the farmers in terms of lessening the impact of destructive insects and animals (i.e, “waya waya” a type of hopper, corn borers, and rat infestation). During “rest period” of the land for 2 to 4 months, insect and rat infestation die down. With staggered planting, farmers claim that they loose as much as 30% of their crop as insects and rats only continue to intensify and transfer from one plot to another.

3) Quality of corn is poor.

Several aspects of the corn production and marketing system affect the quality of corn in the area. Due to the large number of small farmers (with small plots), the quality of corn flowing into the market is uncontrolled. The DA program of clustering the farms into a contiguous area of 200 to 400 hectares was suppose to provide the economies of scale of corn production, which would eventually lower production cost and at the same time ensuring better quality of corn. But this was not realized although the corn coordinators have already laid out the physical division/clustering of their respective areas (province-wide and city-wide) on paper. Prevailing complaints on the quality of corn are the unacceptable moisture content (acceptable is 14%) and dirty corn due to poor shelling practices.

4) Others

Shrinking of planting area due to the shift to other crops and lack of post harvest facilities is a developing trend, however corn remains as the fall back crop of farmers and will continue to be significant in the future.

12.4 Corn Logistics and Bulk Shipping

12.4.1 Main Issues of Corn Logistics

(1) THE CORN STORY

It is often introduced that shipping cost is the major part of the transportation cost and the possibility of reduce cost by shifting the shipment mode from container to bulk. In the Philippines, corn is not carried in bulk. It is shipped in containers from Mindanao to Luzon for use as feed. Most other countries ship corn in bulk using 60,000 metric ton lots. Thus, they are able to enjoy cheaper rates per metric ton of corn.

There are two case studies of comparison between container and bulk shipping: one is from Northern Mindanao through Cagayan De Oro to Manila and another is Southern Mindanao through General Santos to Batangas, Luzon. The first case focuses on corn harvested in Valencia Bukidnon in Northern Mindanao. Corn grains are dried mostly by farmers and bagged. Then local traders assemble and bring them to Malaybalay, where grains are dried again for quality control. Corn grains properly dried and checked are put in bags, containerized and transported to Cagayan de Oro by truck . The following chart shows the comparative freight rates for corn carried in containers and that in bulk.

Table 12.4.1. Transportation Cost from Northern Mindanao to Manila

(Peso/ton of dried corn adjusted)

		Current (Container)	Bulk
Farm	Valencia, Bukidnon		
	Cost of Sacks	80	80
	Trucking	200	200
Assemblers	Malaybalay, Bukidnon		
	Cost of Sacks	90	0
	Trucking	250	200
CDO Traders	Trucking	100	0
CDO Port	Port Handling	30	100
	Wharfage	4	3
Shipping	**Freight ***	**490**	**270**
Manila Port	North Harbor		
	Port Handling	40	100
	Wharfage	4	3
Manila to Caloocan	Trucking	280	190
Total Cost of Transportation		**1,568**	**1,146**
		100 %	73 %

Source: The Next Wave : A premier for the Maritime Industry Development Action Strategy, 2003

In the current system of utilizing container as shown in the table above, total cost is 1,568 peso per ton with container freight rate at 490 peso/ton. For this calculation, current container haulage assumes 18 metric ton per twenty-footer container, and for bulk shipping it is reported to have assumed to employ a bulk vessel of 6,000 DWT. If the shipping mode changes to bulk vessel, the cost would be 270 peso/ton, and the total cost of transportation would be 1,146 peso/ton. This is a reduction of 27% of transportation cost.

In the case of General Santos to Batangas, freight difference would be between 650 peso by container to 470 by bulk vessel. This is a case from Tacurong, Sultan Kudarat, Southern Mindanao to Lipa, Batangas. Total Cost of transportation would be reduced from 1,874 to 1,554, which is a reduction of 17% as shown in the table below.

Table 12.4.2. Transportation Cost from Southern Mindanao to Batangas

(Peso/ton of dried corn adjusted)

		Current	Bulk
Farm	Tacurong, SK		
	Cost of Sacks	100	100
	Trucking	250	250
Assemblers	Sultan Kudarat		
	Cost of Sacks	100	0
	Trucking	300	300
Gensan Port	Port Handling	70	120
	Wharfage	7	7
Shipping	**Freight**	**650**	**470**
Batangas Port	Port Handling	60	60
	Miscellaneous	50	50
	Wharfage	7	7
Manila to Caloocan	Trucking	280	190
Total Cost of Transportation		**1,874**	**1,554**
		100%	83%

Source: Mr. Ramon Atayde: President of SCIPSI

Even though there might be some underestimations of cost such as port charges including handling fee and wharfage, container transportation is more or less represented in the table as the actual cost in the year 2002 or 2003.

(2) COMPETITIVENESS AND BENCHMARKING

Transportation cost is only a part of cost of sales. When we include the farm-gate price of dried corn at around 7 peso per kilo, the total price would be 9.596 peso by container transportation and 9.142 by bulk shipping. The difference would be only 5%, as shown in the table below. This could be one of the reasons that traders do not run the risk of using bulk shipping.

Table 12.4.3. Price of Corn from Northern Mindanao to Manila

(Peso /ton of dried corn adjusted)

	Current	Bulk
Farm Gate Price =	7,000	7,000
Transportation cost =	1,568	1,146
Traders Margin (12%)=	1,028	978
Wholesale Price at Manila =	**9,596**	**9,124**
	100%	95%

However, when the amount of trade is large, the difference of 5%, even though it looks comparatively small, it is still important in the actual trade. Bulk shipping alone can make a difference of 5%, and together with changes in other elements of transportation, the difference can be much more significant.

Therefore in the discussion of this topic, total logistics system should be re-organized rather than just a change of shipping mode. The target reduction ratio would be 12 % where traders under current practice cannot make profit out of the existing mode of transportation. At the same time, the price of corn at customer's factory in Luzon should be competitive against corn from Cagayan valley, so called Isabella Corn.

(3) CONTAINER SHIPPING AND IMPROVEMENT POSSIBILITY

The shipment of corn using containers is prevalent in the domestic trade of Philippine

corn for the following factors:

1) Factor 1 - Quality

Farmers have different quality of corn due to assorted seed varieties, varied drying methods and other factors, and traders do not co-mingle their products. After traders dry the corn grain again for quality assurance, they put their products in bags, thus fit for containerization.

2) Factor 2 - Volume

There are constraints in both supply side and demand side. Because of difference in quality, it is not easy to create large volume needed for economies of scale. At the same time volume of trade in the current domestic market is not large enough to employ larger bulk vessels.

3) Factor 3 – Logistics Constraints

There are no storage silos of sufficient size near the farm nor at port side. For current trade, the volume is not sufficient to justify the construction of silos. In addition, there is no bulk handling facilities because of the same reason.

Therefore in short, key factors for the successful change of logistics system utilizing bulk shipping are 1) Quality control by good dryer system, 2) Increase in production for reaching the enough trade volume, 3) Sufficient storage capacity to stabilize the market.

Loading system and price issues will be solved as a result of improvements in these three factors.

4) Improvements of Factor 1: Quality Issue

Following points should be noted as improvement measures

- Mechanical dryer

Solar drying is not good because it rains often during major harvest season

- Quick dry after harvest

Drying process should be done quickly after harvest in order to control the growth of ‘Aflatoxin’. The Dryer facility with shelling machine should be placed close to the farm.

- Competition against imports

As a marketing strategy, it is important to establish credibility and brand image such as “Mindanao Corn is Good Quality Corn”

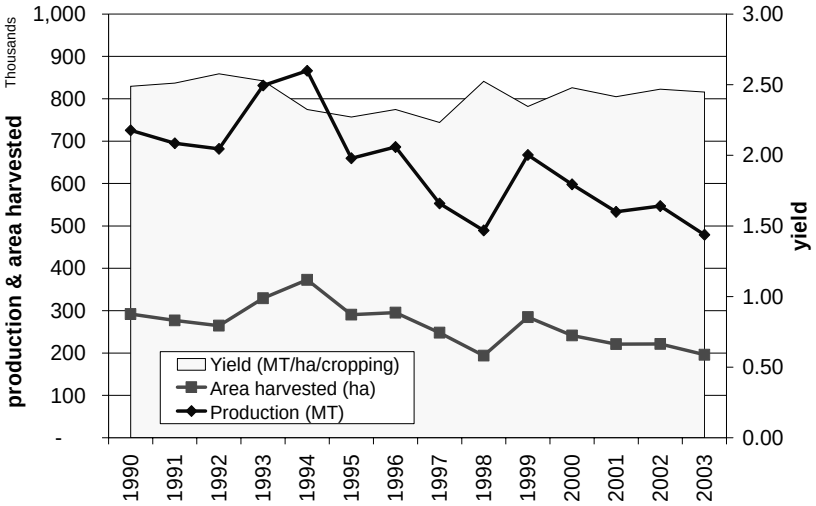
5) Improvements of Factor 2: Cargo Volume Issue

Historical data shows that corn shipment from General Santos to Manila amounts to 100,000 MT/yr in 2003. Because the demand is strong in Luzon for yellow corn, it is possible to reach the volume of 250,000MT which together with corn from northern Mindanao, will supply the deficit of corn. In the previous years equivalent amount was imported.

The target volume of transportation at 250,000 MT/yr will be realized by the reduction of harvest loss and increase of production. The production SOCSKSARGEN is 480,000 MT/yr for which harvest loss is estimated at 70,000 MT and internal demand

is estimated as 350,000 MT/yr. There must be a surplus of 60,000 MT/yr and together with harvest loss, possible amount of shipment Luzon would be 130,000MT in the current production level. If the production increases to the level of 10 years ago, which is the level of 650,000 MT, target volume will be easily realized.

Figure 12.4.1. Yellow Corn Production in SOCSKSARGEN



At the same time it should be noted that the hybrid seed for yellow corn is already at 85% for its production input. But the diversification of cropping and the cropping pattern has been different from those of 10 years ago, increase of production of corn needs encouragement to farmers with proper instructions of processing and new system adopted by the project organization.

Table 12.4.4. Mindanao Corn Production Area

	OPV	Hybrid	Others	Total	Ratio of Hybrid
Yellow Corn	43,822	352,919	23,535	420,276	**84%**
White Corn	212,804	79,804	757,890	1,050,498	8%
Total	256,626	432,723	781,425	1,470,774	29%

Source: BAS: as of Dec.31,2003

Table 12.4.5. Corn Production Data: South Cotabato Province

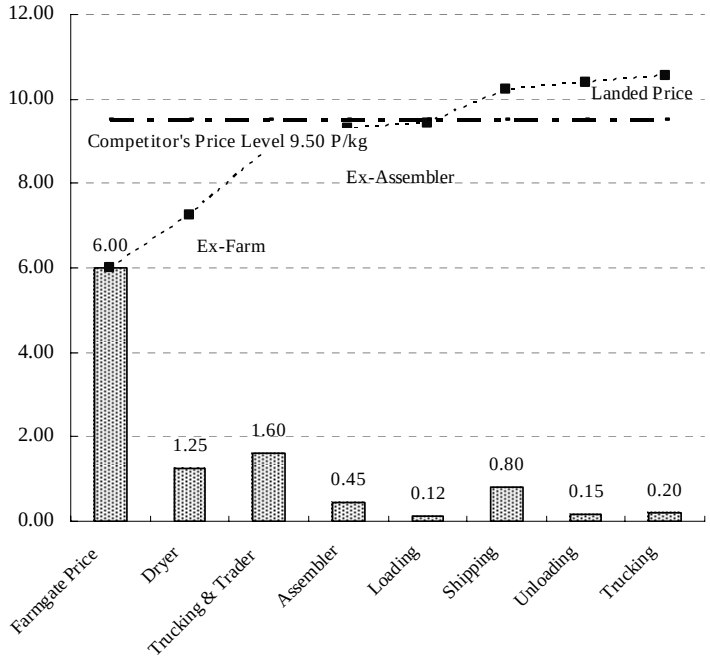
Municipality	**Yellow**	White	Total	**Yellow**	White	Total	**Yellow**	White	Total	Yellow Corn
	Production Area Planted (has.)			Area Harvested (has.)			Production Volume (MT/Yr).			Yield
Banga	**14,959**	3,585	18,544	**20,877**	7,106	27,983	**86,127**	20,338	106,465	4.1
Koronadal	**6,687**	4,457	11,144	**8,951**	4,833	13,784	**37,856**	17,985	55,841	4.2
Lake Sebu	**14,704**	15,210	29,914	**12,265**	13,762	26,027	**54,199**	42,003	96,202	4.4
Norala	**925**	65	990	**1,152**	102	1,254	**5,157**	337	5,494	4.5
Polomolok	**3,715**	2,200	5,915	**4,635**	2,118	6,753	**17,179**	6,367	23,546	3.7
Sto. Nino	**1,696**	454	2,150	**2,199**	449	2,648	**10,084**	1,511	11,595	4.6
Surallah	**9,093**	18,692	27,785	**9,238**	16,886	26,124	**37,099**	46,079	83,178	4.0
Tampakan	**6,250**	1,352	7,602	**6,908**	2,124	9,032	**29,884**	5,346	35,230	4.3
Tantangan	**1,120**	430	1,550	**1,417**	573	1,990	**6,020**	1,937	7,957	4.2
Tboli	**3,351**	10,082	13,433	**3,325**	10,476	13,801	**10,462**	26,561	37,023	3.1
Tupi	**4,667**	1,193	5,860	**4,550**	1,211	5,761	**20,303**	4,237	24,540	4.5
TOTAL	**67,167**	57,720	124,887	**75,517**	59,640	135,157	**314,370**	172,701	487,071	4.16

6) Competitiveness Issue

Price of yellow corn is dominated by the wholesale price in Luzon. Traders in

Mindanao tend to mark up the price for the local sales in Mindanao corresponding to the price in Luzon. Therefore the ex-assembler price in Mindanao is currently the same level as that of Luzon.

Figure 12.4.2. Composition of Cost of Corn Transported from Mindanao and Sold at Manila



It is recognized by feed miller as a rough cost estimate in 2004 that transportation cost from Mindanao is 1.5 peso per kilo and 1.0 peso from Isabella and 0.7 peso from Pangasinan. As long as quality is acceptable, millers look for a supplier with the lowest price possible. The estimate of Mindanao corn landed price at Luzon is approximately 10.50 peso per kilo where Isabella corn is 9.50 in July 2005. In order to make Mindanao corn competitive, traders need to cut their profit margin. Then traders do not prefer to sell to Manila, but rather they tend to sell to local market with sufficient mark-up to the price equivalent of Manila.

Even though demand is growing in Mindanao, it is not large enough to absorb all the yellow corn grain yet. In other words, supply capacity is existing in Mindanao as well as constant demand exists in Luzon. Therefore the key issue is the price of corn transported from Mindanao. The result of survey indicates that the price of corn landing at Manila needs to be reduced by more than 1 peso, or set the target price at customer's warehouse at less than 9.50 peso/kg.

In order to realize this, it is crucially necessary to restructure the logistics system and marketing system - not only by the change of shipping mode from container to bulk vessel.

The new system is proposed in order not to drastically interrupt the existing trade system, but rather it will give option to farmers for increasing production and use of facilities so that additional crops will contribute to the trade from Mindanao to Luzon.

7) Corn Yield and Recovery Ratio

In this report, tonnage indications of corn are converted to shelled and dried weight. The average recovery rate is indicated in the following table which shows fresh harvested corn weighs approximately 10 tons and becomes 5 tons of dried grain. There are seasonal differences between the dry and wet season - and the main

harvest is in the wet season.

In the process of the study, information and statistical data of misleadingly high yield using tonnage before processing were carefully sorted out. In this report, tonnage indication is interpreted to Net Yield with 14% moisture content.

Table 12.4.6. Corn Yield and Recovery Ratio by Post Harvest Processing

	Dry Season		Wet Season	
Net Harvest (Corn with Cob)	**9**	ton/ha	**10**	ton/ha
Shelling Recovery	65%		65%	
Net Yield (Grains)	5.85	ton/ha	6.5	ton/ha
Moisture Content (at fresh harvest)	28%		30%	
Final Moisture Content level	14%		14%	
Drying Recovery	84%		82%	
Net Yield (Grains MC14)	**4.9**	ton/ha	**5.3**	ton/ha

Note: Average yield of Mindanao Yellow Corn is 8 to 12 ton with cob by Hybrid Seed.

8) Post Harvest Loss

Because of the seasonal nature in the production of corn, substantial amount is discarded as loss. The Bureau of Post-harvest Research and Extension summarized the Post Harvest loss in the following table. As is shown in the table, shelling and drying makes loss of more than 7 % in total and during storage more than 3% becomes loss.

In addition to these numbers, the study team found in the site survey that farmers cannot sell based on prevailing market values because of the lack of transportation to shellers and dryers during the harvest season. Small farmers all depend on sun-dry or left incapable of processing their product thereby cannot sell to the market. As a result, loss by social reason may double the ratio of loss in the farmland.

Table 12.4.7. Post Harvest Loss

Harvesting	1.3%
Piling	1.0%
Shelling/Cleaning	**2.7%**
Drying	**4.6%**
Storage	**3.1%**
Total	12.7%

Source: "Technical Reference Guide on Grains Post-harvest, 3rd edition 2000", Bureau of Post-harvest Research and Extension

12.5 Components of Corn Logistics

The target volume of corn to be transported is calibrated as 250,000 ton per year in consideration with potential demand in Luzon, vessel operation and possible capacity of production in the Southern Mindanao. In order to prepare for the logistics system, Bulk Vessel, Dryer, Silo and portside cargo handling facilities are independently studied and their performance characteristics are analyzed in this chapter.

12.5.1 Bulk Vessel Operation for Efficient Transportation

The optimal size of bulk vessel has been determined to be 5,000 DWT considering the efficiency in vessel performance and coordination with cargo handling facility at both Gensan and Batangas Port. Most possible and feasible operation plan will be

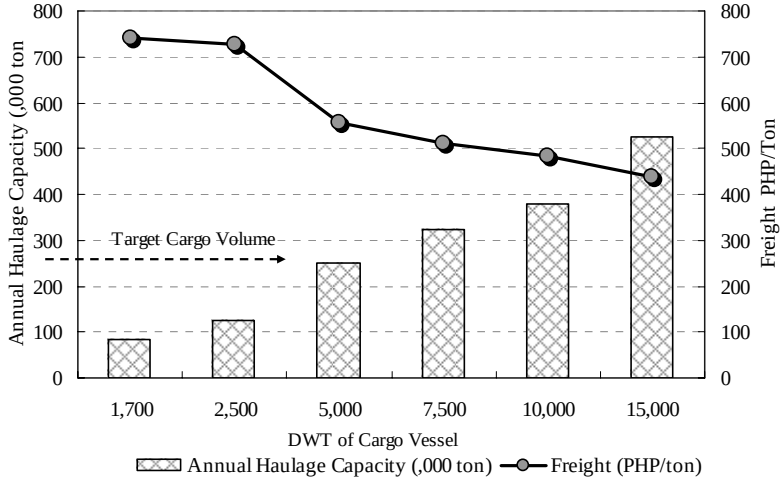
arranged in relation to vessel size, frequency of operation, cargo handling capacity, cost and cargo volume.

It should be noted that this is a plan for domestic shipping and the condition is very different from international bulk shipping. Common sense for international bulk shipping is not applicable because 1) the volume of cargo is limited to the amount of cargo of approximately 250,000 metric ton per year, 2) the shipping service has to be provided by regular interval for the continuous supply to feed millers to meet the demand, 3) the facility to handle bulk cargo is very limited on both loading/unloading side and thereby cannot operate large vessel (e.g. Panamax).

For the comparison of efficiency by size of vessel, information on bulk vessel is collected considering the difference in size and operational costs. Based on interviews to operators, operational costs are standardized for comparison and trip cycle is planned considering navigation days and loading/unloading time.

Generally the cost of shipping decreases as the size of vessel increases. However the loading/unloading capacity on shore-side cannot deal with the increase of haulage capacity and the port staying time increases. Therefore the port staying time becomes longer and reduces efficiency in transportation as a whole.

Figure 12.5.1. Comparison of Bulk Carrie by Size, Haulage Capacity, and Freight Rates



Calibrating the total cargo amount as 250,000 MT per year, weekly service would be conducted by a vessel size of 5,000 DWT. The cost of operation including fixed cost is also reduced significantly compared to smaller sized vessels. The figure below exhibits the comparison and trend of cost reduction by the increase of the vessel size.

Variable cost includes Fuel Cost and Port Charges. Fixed cost includes Crew expenses, Storage & Supplies, Insurance, Lubrication Oil, Depreciation, and Docking & Maintenance expenses which are annualized based on 2.5 years regular docking expense.

The freight indicated here includes the 50% margin for the financial cost and 30% profit margin for shipping company.

For the calculation of trip days, distance between General Santos and Luzon, Batangas is set as 670 nautical miles. Market value of vessel is surveyed in various websites of brokerage firms and adjusted for the vessel value of 10 years old. Economic life for the calculation of Depreciation is assumed to be 20 years so that

total expected life of vessel is assumed to be 30 years.

Table 12.5.1. Comparison of Freight by the Size of Vessel (MT, or PHP)

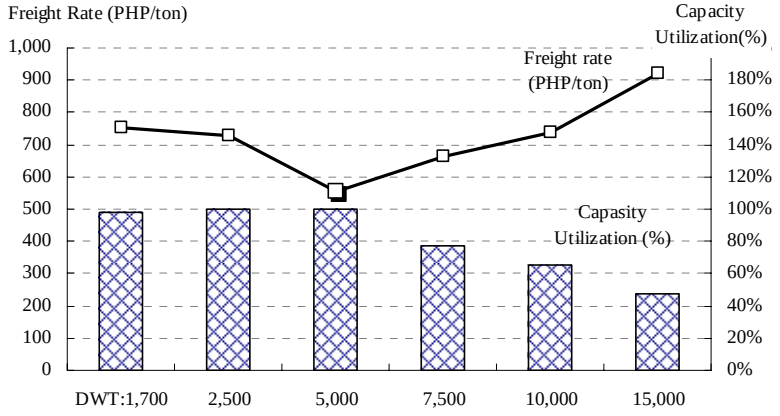
Vessel Size: DWT	**1,700**	**2,500**	**5,000**	**7,500**	**10,000**	**15,000**
Speed (Knot/hr)	11	11	12	12	12	12
Turn Around Days	7.0	7.0	7.0	8.0	9.0	10.0
Annual Turn Around (times)	50	50	50	43	38	35
Annual Haulage (M ton)	**85,000**	**125,000**	**250,000**	**322,500**	**380,000**	**525,000**
Vessel Market Value (PHP)	85,000,000	92,949,190	294,508,171	456,861,073	479,944,469	781,971,991
Annual Variable Cost	24,946,136	39,869,816	56,047,810	60,464,833	68,330,262	76,174,390
Annual Fixed Cost	9,703,200	10,712,789	21,114,227	30,694,142	33,157,723	50,379,925
Total Annual Cost (PHP)	34,649,336	50,582,605	77,162,037	91,158,975	101,487,985	126,554,315
Freight Cost (PHP/ton)	408	405	309	283	267	241
Freight (PHP/ton)	734	728	**556**	509	481	434

In addition to bulk vessel, barge operation was studied. But it was proved to be not feasible at all because of high cost of diesel used by tug boat. As a result the freight rate by barge exceeds 2,000 PHP per ton of cargo. Tug and barge system fits to shorter distance and more frequent operation.

In order to transport target volume of 250,000 metric ton per year, large vessel does not operate by sufficient ratio of capacity utilization. As shown in the figure “Comparison of freight rates”, larger vessels such as 7,500 DWT uses its capacity by 80%, or vessel of 10,000 DWT uses only less than 70% of its capacity, and for vessel of 15,000DWT it is only 50%.

On the other hand, use of small vessels requires more than one unit for transporting the target volume. Smaller vessels such as those of 2,500 DWT need 2 units and those of 1,700 DWT need 3 units. For these vessels capacity utilization is 100%, but the freight cost is higher than the vessel of 5,000 DWT. As a result, vessel of 5,000 DWT is the most efficient and cost competitive as against other sizes of vessels.

Figure 12.5.2. Comparison of Freight Rates by Vessel Size



12.5.2 Dryer for Quality Control (including shelling machine)

(1) DRYER – TYPE A (DIESEL POWERED)

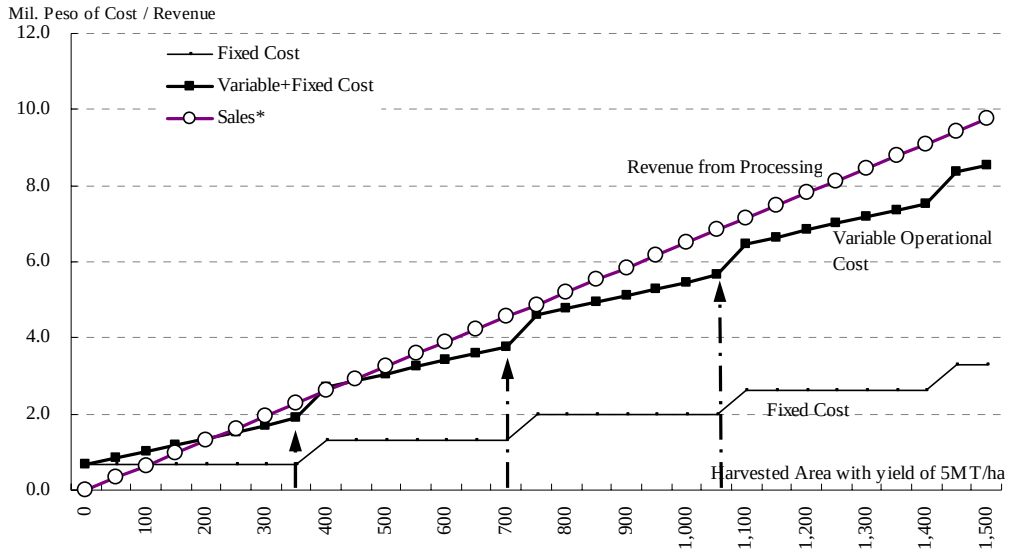
Based on the assumption that the harvest is assumed to be 5 ton per hectare, the profitability is indicated in the size of farm cluster by hectare.

In the scheme A, small dryers with shelling machine will be placed near the farm so that farmers can quickly process their crop and keep quality in good condition. Because farmers do not want to co-mingle their harvest with others, standard holding capacity of dryer is designed to accommodate the harvest of one family which is approximately 8 metric tons.

The dryer is a batch re-circulating type which uses diesel as source of heat. Recent increase in the price of oil influence the operational cost of dryer, and the calculation in this study reflect the most recent data of diesel cost at 30 Peso/litre as of July 2005.

In the figure, vertical distance between revenue and operational cost indicated by white circle and black square is the profit margin at each size of farmland.

Figure 12.5.3. Break-Even Analysis of Dryer, Batch Re-circulating Dryer (8-ton/batch)



Therefore the break-even analysis here indicates that profitable operation by one machine is realized only at the size of farm cluster more than 300 and less than 400 ha. The graph shows small margin by this operation. In order to make one machine operation feasible, farmer cluster needs to be approximately 350 ha.

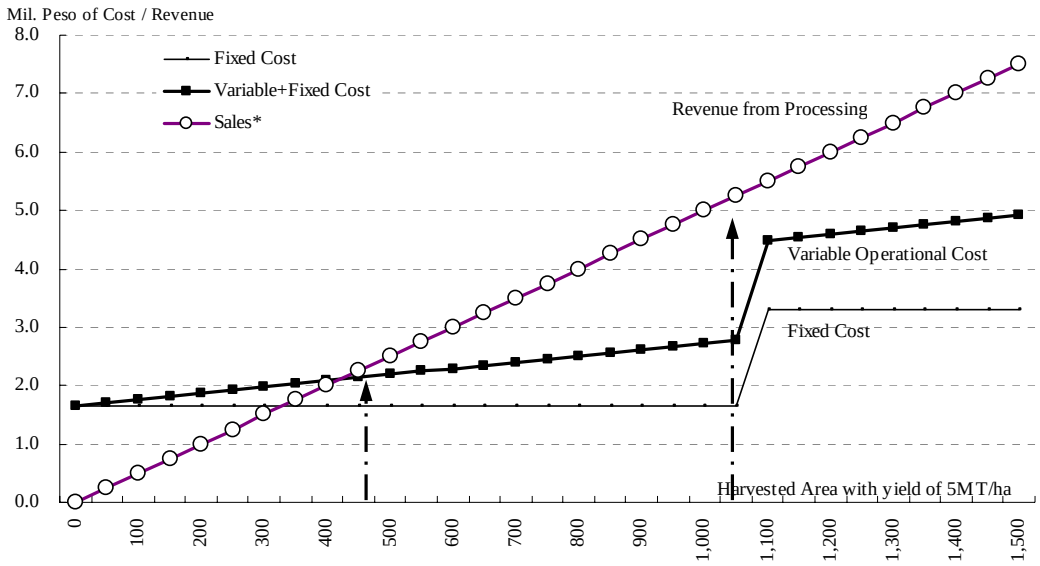
(2) DRYER – TYPE B (BIOS-MASS POWERED)

There is a possibility to use rice hull or corn cob as source of heat by an additional burner. This system is called Bio-mass burner system. The burner supplies hot air for 3 batch dryers to be operated at the same time. Therefore the capacity is 3 times as large as the case of type A, and the expected farmer cluster should be 3 times larger.

Due to the bio-mass fuel, operational cost is fairly cheap compared with that of Type-A even though the initial investment is slightly higher because of the additional burner. For the fuel cost, trucking fee of rice husk is accounted for as 50 P/ton. Consumption of rice husk is assumed to be 300 kg/hour for three dryer units of 8 ton each. Because of the low cost nature, dryer service charge can be set at 0.80 peso, which is much cheaper than the assumed charge of 1.30 peso by the type A.

Based on the Break-even analysis, minimum size of cluster is 450 hectare and the maximum capacity is 1,050 ha. In the Grains Highway Program of the DA describes that the ideal size of corn cluster for cooperatives is about 500 hectares, while the medium-sized cluster for LGUs is 1,000 hectares at the farm level. Therefore the policy of DA for farmers' cluster can be supported by the analysis here.

Figure 12.5.4. Break-Even Analysis of Dryer with Bio-mass Burner for Three Batch Re-circulating Dryer (24-ton/batch)



12.5.3 Silo and Cargo Handling Facility for Volume Control

(1) SILO – TYPE A (PORT SIDE GRAIN TERMINAL WITH LARGE SILO)

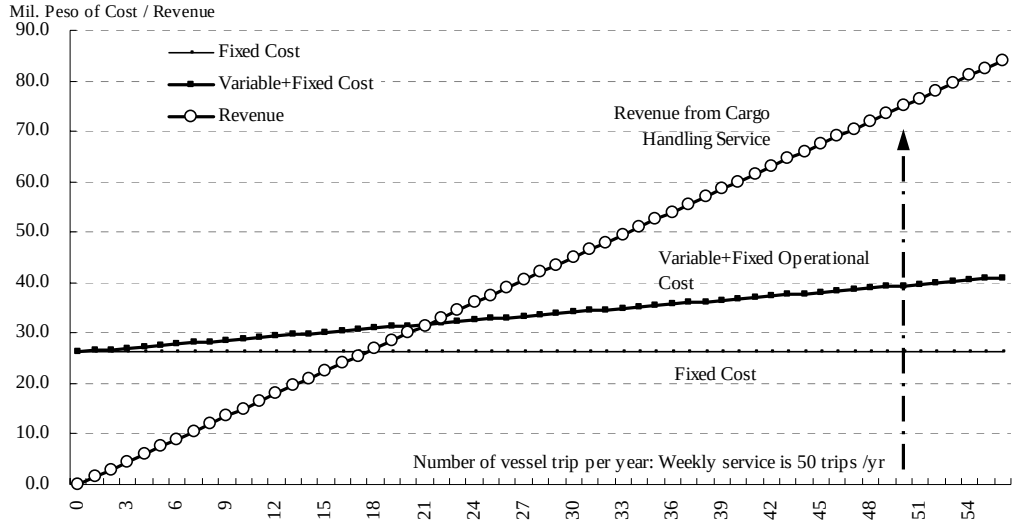
In addition to the dryer unit, Type-A, storage system silo would be constructed. Silo and Cargo Handling facility are the key facilities for logistics system because it controls amount of commodities supplied from the area to the market. Silo does not limit to transportation to Luzon but to local market so that it will function as price stabilizer.

Standard system of large silo and quick loading facility is examined, and resulted in a conclusion of the combination of silo with holding capacity of 50,000 ton and cargo loading system of 300 ton per hour. Even though the initial investment is large, operational variable cost is relatively small and the break-even-sales is 90,000 ton per year, which is achieved by 19 weeks of 5,000 ton throughput.

The target volume of 250,000 ton will bring revenue of 50 million peso and approximately 30 million peso as profit when cargo handling fee is set at 300 peso per ton. Considering the current cargo handing fee as 105 peso per ton, with arrastre 85.55 plus stevedoring 20.05 peso, fee including storage at silo needs to be more than double.

With the loading speed at 300 TPH, vessel of 5,000 DWT will be fully loaded within one day, so that weekly operation becomes possible. With feeder silo at 150 sites near farm dryers in scheme A, port-side silo will work as grain reserve center of Socsksargen.

Figure 12.5.5. Break-Even Analysis of Cargo Handling Operation at Port Grain Terminal



The system of port grain terminal is designed to accommodate 10 weeks discharge amount, or 50,000 tons of grain. Duration of harvest is approximately 8 weeks for each season, and within this season vessel will operate and grains will be carried. With capacity of silo at local dryer site, annual total cargo throughput will reach 250,000, equivalent to the target amount. For the construction of silo and terminal, a large parcel of land is necessary as a prerequisite.

Table 12.5.2. System Design Dimension of Port Grain Terminal with Silo-A

Conveyor Speed	300	ton/Hr
Working Hour	18	hr/day
Production Capacity	5,400	ton/day = shipping/week
Actual cargo to be discharged by vessel	5,000	DWT of vessel
Shipping schedule (Weekly service)	50	weeks/year
Annual Total Haulage	250,000	total shipping ton/yr
Max holding time at Silo portside	10	weeks
Design of Silo capacity	50,000	Silo Capacity

(2) SILO TYPE-B (INLAND NEAR THE DRYER)

For the Biomass burner dryer, Type-B, adequately large silo is prepared next to the dryer and needs synchronize the delivery of corn grains. The capacity of silo is set at approximately 1,800 tons. For the annual process volume of 5,000 tons of grain from one dryer type-B unit, 2.8 times of turn round will be appropriate considering the duration and two seasons of harvesting.

Table 12.5.3. Silo-B System Design Dimension of Silo at farm

Design of Silo Capacity	1,875	ton
Annual Turn Round	2.8	times
Annual Handling Volume	5,250	ton
Total Volume of shipment	250,000	total shipping ton/yr
Required Units	48	Units
Max holding time at Silo	4.3	Months

Portside facility for the Silo-B is only 5,000 ton which handles weekly discharge of grains as a transit silo. Port side facility is minimized and inland silo will serve as stock

points right after dryer processing. One benefit of having silo inland is galvanized steel is safe to use as opposed to silo at portside where corrosion by salty wind from ocean requires frequent maintenance.

12.5.4 Land Transportation

Dried grain from farm area to portside should be transported by truck service every day. Trailer van at the size of 25 ton of bulk haulage will be employed with total of 29 effective units. This service is delegated to private sector for price competition. Here in this study the price is set at 800 peso per ton of cargo from farm silo to port, which is higher than the current rate reflecting the recent increase of oil.

Table 12.5.4. Silo-B System Design Dimension of Silo at Farm

Truck load	25	ton/trip	350 (days / year)
Total trip to Port	10,000	trip/year	1 trip / day
Average Distance	150	km	
Number of Truck required	29	Units	
Cost of truck transportation	680	P/Ton	
Freight Charge	800	P/Ton	

12.6 Logistics Scheme

12.6.1 Concept and Objectives of the Logistics Scheme

The logistics schemes in this section provide overall vision of the development of corn industry from harvest to processing, warehousing and shipping to the customers. Utilizing the components described in the previous section, two schemes are presented in order to effectively utilize economies of scale brought about by the bulk handling system promoted by bulk vessel operation.

Specifically, the logistics schemes aim to:

(1) Improve corn grain quality, and ensure market access to farmers' corn products,

(2) Improve efficiency of post-harvest processing and minimize losses,

(3) Facilitate integration of corn related business in order to take benefit of economy of scale, and promote fair share of the small holder farmers in the trade of corn. This will lead to increase in the income of the stakeholders including farmers thereby alleviate rural poverty.

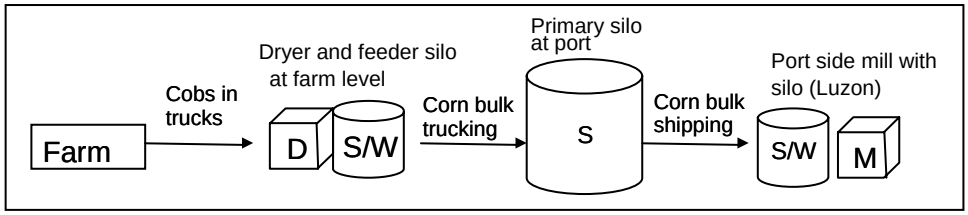
(4) Improve bulk shipping between Mindanao and Luzon and encourage traders to increase business by utilizing shipping service.

(5) Encourage production of corn in the Southern Mindanao

12.6.2 Scheme - A

"The Scheme-A" focuses on the major silo at port grain terminal, with the capacity of 50,000 ton, and near-the-farm dryer centers at 150 locations throughout SOCSKSARGEN for farmer clusters of 350 ha each. This scheme is based on the concept that farmer organization is possible only at the size of 350 ha which is approximately 230 farming families.

Figure 12.6.1. Diagram of Scheme A



The dryer centers are planned to be located near the farm with an initial investment of 4 million peso/unit for 8 ton batch, 24 tons per day of three-shift operation at peak season. One machine handles corn of 1,750 tons from 350 ha farm with assumed yield of 5 ton/ha per season.

The dryer center near the farm contributes to guarantee the quality of yellow corn. The size of dryer is good enough to accommodate only one farmer's harvest at one time. Dryers are invested and operated by LGU and the dried corn will be transported to the primary large silo at portside. Adjacent to the dryer, each center has a silo in order to store dried corn until they are transported to port silo.

Grain terminal at Port has a silo which should be large enough to accommodate two peak seasons of harvest, and the loading system should be fast enough to operate for shipload grains within one day. The size of silo is 50,000 ton and conveyor speed is assumed to have 300 ton/hr productivity with which daily production will be enough to load 5,000 ton of shipload. Considering the weekly service of one vessel at 5,000 DWT, annual haulage will reach 250,000. The silo accommodates more than 2 months haulage at portside with initial investment of nearly 170 mil peso.

There are two sets of major difficulties and strengths for this scheme. The first one is the requirement of a large area for establishing a large silo at port, but once it is built, it will be an efficient facility to handle corn grain. Another set of difficulty and strength is that the dryer near the farmer is small in size thereby easy to establish but the total number of requirement being 150 units may be difficulty to achieve and organize. So in this scheme it might be important to focus on the port side facility and vessel. Once these operations are successful, then the marketing of current trade of corn grains will find it as additional channel thereby encourage the production and reduction of wastage. The management of the portside facility is the first and primary key to the success of this scheme.

Table 12.6.1. Scheme - A: Outline of Investment and Operation

1. Dryer-Silo Service near Farm	Max	Unit	Total	
Expected Annual Handling	1,800	150	270,000	ton/year
Investment Amount /Unit	4,864,355	Peso/unit		
Total Investment (incl. silo)	729.7	Mil Peso/total		
Drying Service Charge	1.30	P/kg		
Fixed Cost(Depreciation)	28.8	Mil P/ year		
Variable cost for Service	699	Peso / Ton		

2. Port Grain Terminal	Holding Capacity	Turn around	Total	
Expected Annual Throughput	50,000	5	250,000	
Terminal Loader Capacity	250,000	Ton/Year		
Port Handling Charge (incl. silo)	300	Peso/ton		
Investment Amount (incl. silo)	167.5	Mil Peso		
Fixed Cost	26,207,443	P/ year		
Variable cost for Service	54	P / Ton		

3. Land Transportation				
Truck load	25	ton/trip	350	trip/year/unit
Total trip to Port	10,000	trip/year		
Average Distance	150	Km		
Number of Truck required	29	Units (as minimum		
Cost of truck transportation	680	P/Ton		
Freight Charge	800			

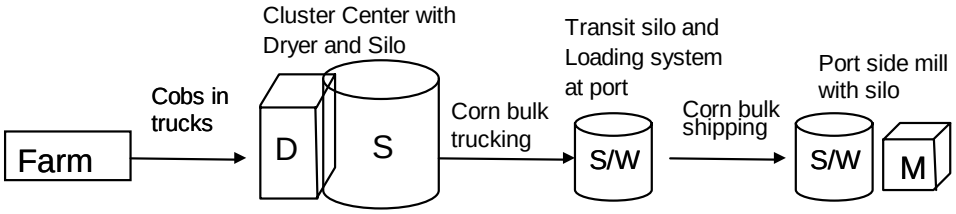
4. Sea Transportation		
Investment Amount	294.5	Mil Peso
Fixed Cost	21,114,227	P/Year
Variable cost	1,120,956	P/trip
Freight Charge	556	P/Ton

5. Total Investment	1,192	Mil Peso
Economic Life	15	Years

12.6.3 Scheme - B

"The Scheme-B" focuses on establishment of dryer and silo at farmer's cluster center. On the other hand, portside facility is simply for loading function. The concept behind this scheme is to develop reasonably large post-harvest centers, and make them key facilities of logistics system.

Figure 12.6.2. Diagram of Scheme B



Farmers sell their harvested fresh corn to the cluster center. The center consists of relatively large scale dryer with 3 machines together with bio-mass burner and silo with holding capacity of nearly 2,000 ton. Annual processing amount is estimated to be 5,000 tons for total harvested area of 1,000 ha by 2 seasons. Initial investment is estimated at 23 million peso per center and total of nearly 50 sites are needed to be developed with this facility.

Because bio-mass burners use rice husks or corn cob as source of heat, the operation cost will be very low compared with diesel. Therefore the three dryers will be operated at a time and the size of cluster needs to be large enough to sustain the efficient

operation of the system.

Portside silo in this scheme need not be very large but just enough size of 5,000 tons to accommodate one shipload at a time because stock is primarily kept in silos at 50 cluster-centers. Loading speed, vessel size and frequency is assumed to be same with the scheme A, which is operated by 300 TPH, vessel size of 5,000 DWT and weekly shuttle operation.

Table 12.6.2. Scheme – B: Outline of Investment and Operation

1. Drying System	Max	Unit	Total	
Expected Annual Handling	5,400	47	253,800	ton/year
Investment Amount (/Unit)	11,200,000	Peso/unit		
Total Investment	526.4	Mil Peso/total		
Drying Service Charge	0.80	P/kg		
Fixed Cost(Depreciation)	31,584,000	P/ year		
Variable cost for Service	213	P / Ton		

2. Silo System at Dryer site	Holding Capacity	Turn around	Annual Total	Unit
Expected Annual Throughput	1,875	2.8	5,250	48
Investment Amount (/Unit)	11.5	Mil Peso		
Total Investment	550	Mil Peso		
Storage Charge	0.60	P/kg		
Fixed Cost	73,294,442	P/ year		
Variable cost for Service	11	P / Ton		

3. Port Loading system	TPH	Hr/day	Days	Annual Capacity
Expected Throughput	300	18	50	270,000
Silo for Temporary Storage	5,000	Ton		
Investment Amount	52.4	Mil Peso		
Loading Charge	120	P/ton		
Fixed Cost	9,282,854	P/ year		
Variable cost for Service	10	P / Ton		

4. Land Transportation

Truck load	25	ton/trip	350	trip/year/unit
Total trip to Port	10,000	trip/year		
Average Distance	150	km		
Number of Truck required	29	Units		
Cost of truck transportation	680	P/Ton		
Freight Charge	800	P/Ton		

5.Sea Transportation

Investment Amount	294.5	Mil Peso	250,000	ton/year
Fixed Cost	21,114,227	P/Year		
Variable cost	1,118,456	P/trip		
Freight Charge	556	P/Ton		

6.Total Investment	1,424	Mil Peso
Economic Life	15	Years

The major difficulty for this scheme is to have a solid organization of 1,000 ha size of farmland and establish good dryer-silo operating system at cluster level. Once the organization is successfully formed, marketing of corn will be effective and both farmers and operators of this logistics system will benefit from it.

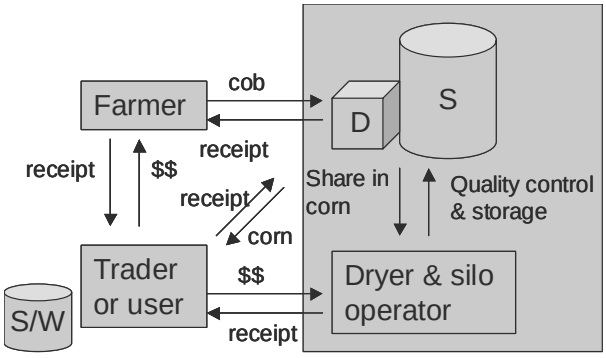
12.6.4 Corn Marketing System

There are several reasons of focusing on dryers and silo in the corn logistics system. The dryer is important to standardize the quality and silo is important to market the commodity by giving options for farmers by the warehouse receipt system.

The Warehouse Receipt System is supported by the guarantee of the dryer-silo

operator where farmers deliver their fresh harvested corn in cob and the operator issues receipt as certificate of goods in silo. The processing fee will be a share of the dried corn output. The receipts are the sold by farmers to traders or users who will then withdraw the cried corn from the silo. The system is similar to the "*quedan*" system of marketing and warehousing in the sugar industry. By this warehouse receipt, farmers have options to sell or keep their commodities, thereby they can make own decision according to the market price. The dryer-silo operator can be either public or semi public such as cooperative or federation as long as it has enough financial and management capability and credibility.

Figure 12.6.3. Diagram of Marketing System by Warehouse Receipt



This system can be applied to both schemes, where scheme B has more possibility to adapt this system because dryer and silo are placed side by side near the farm and managed by one operator. The number of operators in the scheme B is 50, whereas in the scheme A it is 150. Naturally, the less the number of organization, the easier it is to realize successful management as a whole. In the scheme A, both dryer operator and port silo operator need to be linked and agreeable on the transaction of both corn grains and financial processing.

12.7 Evaluation and Financial Feasibility of Development Schemes

12.7.1 Assumptions in the Business Environment

There are several assumptions for the financial feasibility study. Price of oil is rising and for the calculation of fuel cost, most recent price as of July 2005 is used. This new price influences the operational cost of vessel, dryer and truck. Although the feasibility of the planned schemes are examined by adopting the updated price of 30 peso/litre of diesel, cost analysis of current system is based on the data between February and July of 2005, where the diesel cost is 21 peso per litre.

The cargo volume is expected at 85% of the target volume in the first year, then 90% and 95% for the following years. In the fourth year, the volume is assumed to reach 100% of the target. The cargo is additional corn grains which do not interfere with the existing trade of corn in Mindanao. However because the capacities of facilities have allowance to deal with more than the target volume, there are possibilities in meeting with additional local demand, as well.

Initial investments are assumed to be financed at 100% by loan with repayment period of 15 years which corresponds to the economic life of facilities. Terminal value at the end of 15 years is assumed to be 40% of the initial cost.

Considering that possibility that semi-public organizations will become the organizer of the entire logistics system, management fee is charged to the total logistics operation in the amount of 100 peso per ton for both schemes. This charge should be borne by each operational component prorated by the profit amount. It is intended that by this fee, the management body obtains self-sustainability without any dependency on public finance in the form of subsidy from local government.

Table 12.7.1. Comparison of Scheme and Summary

	Scheme - A		Scheme – B	
Concept	Small dryer and Large Portside Facility with Silo		Large Dryer with silo at town center and small facility at port	
Farm Organization	Minimum 250 ha Max 350 ha /one unit Target Collection: 1,500 t/yr	Approx. x 150	Minimum 550 ha Max 1,050 ha /one unit Target Collection: 5,000 t/yr	PHP 11.5 Mil x Approx.50 = 575 mil P
Post Harvest Facility	Shelling Machine: 30 ton/day Dryer: 8 ton x 3 = 24 ton/day Annual Capacity: 1,800 ton Annual Target:1,500 ton/year	Approx.150 sites x 3.2 Mil = 480 Mil PHP	Shelling Machine: 30 ton/day Dryer: 24 ton x 3 = 72 ton/day Annual Capacity: 5,400 ton Annual target: 5,000 ton/year	Approx. 50 sites
Warehousing facility near the farm	Temporary Silo 200 ton Dried Corn will be delivered to Port Silo	150 sites x 0.8 Mil P = 120 Mil P	Silo at 1200 MT size attached to dryer	4 Mil P x 50 = 200 Mil P
Port Facility-Silo	Large Silo with Capacity of 50,000 MT	100 Mil P including loading facility	Small Silo 6,000 MT at port near loading facility 5,000 ton weekly loading x 50 = 250,000 ton/year	50 Mil P with Loading Facility
Loading / Unloading	loading facility at speed of 300 TPH		Loading Facility 300TPH	
Vessel	5,000 DWT Bulk carrier weekly Service x 50 = 250,000 ton/year	300 Mil P	5,000 DWT Bulk carrier will be employed for weekly delivery	300 Mil P
Total Investment	1,192	Mil PHP	1,424	Mil PHP
Investors on Dryers	Local Trader, Coop or LGU		Large Coop,	
Investors on Port side Facilities	Terminal Operator, Grain Trader LGU		Terminal Operator, Grain Trader LGU	
Total Management	DA in relation with LGU, Coop		DA in relation with LGU, Coop	
Operation conditions	Large number of dryer operation Large Port-side Grain Terminal		Large dryer with Grain Silo to be properly managed by private operators	
Prerequisite	Large Port-side land is necessary for terminal		Large Properties are necessary at provincial center	

12.7.2 Project Evaluation by Return on Investment and Price Competitiveness

Because there are two schemes for the development of logistics system, both schemes have strength and weakness. In terms of initial investment, scheme-A requires 60% on Farm site Dryer & Silo and total amount of investment will be nearly 1,200 million peso. Scheme-B requires 75% of total investment on Farm site Dryer and Silo system. Investment on shipping is the same and the amount is nearly 300 million peso for purchase of vessel and setting up of operation. The ratio of investment for shipping facilities is 25% in Scheme-A and 20% in scheme-B.

Table 12.7.2. Initial Investment Amount by Scheme (Mil Peso)

Scheme – A Total Investment Amount (Mil Peso)		**Scheme – B** Total Investment Amount (Mil Peso)	
Farm site Dryer & Silo	730 (60%)	Farm site Dryer	526 (37%)
Silo or Warehouse	NA	Silo system	550 (38%)
Port Grain Terminal (Silo & Loading)	167 (14%)	Loading facility at portside	52
Shipping	295 (25%)	Shipping	295 (20%)
Total (Mil Peso)	**1,192**	Total (Mil Peso)	**1,424**

First, project feasibility is examined by the return on investment as a whole in each scheme by calculating the Internal Rate of Return (IRR) based on the cash-flow forecast. Scheme A shows 21 % of return and B shows 22 %. The rate of return here is calculated before tax and before loan repayment, so that influence by the financing conditions and tax treatment issues are eliminated. Both schemes showing the rate of return more than 20% mean that they are feasible if the business environment is reasonable.

Table 12.7.3. Return on Investment Based on Cashflow Forecast

Comparison of Feasibility by Scheme & by Component	**A**	**B**
IRR for the operation of the whole system, before tax & loan repayment	21%	22.4%
Sector: Dryer (After Tax, After Repayment)	5%	11%
Sector: Silo (After Tax, After Repayment)	NA	10%
Sector: Portside Loading System (Aft Tax, Aft Repayment)	9%	11%
Vessel Operation (After Tax, After Repayment)	11%	11%

As for the individual component such as dryer and shipping, each component is analyzed on the basis of its future cash flow by estimating cost and revenue based on the cargo forecast and deduct 12 % of loan interest payment and 32% of tax payment from the net profit. Here in this study, revenue will increase by charging high for the cargo per unit but it will decrease the competitiveness at the point of sale in Luzon.

So this is a situation wherein there is a dilemma to meet two requirements; i.e., one for the sustainability of each business component and another for the price to be low enough to be competitive. So the rate of charge in each component has been simulated to give better return for the operator and at the same time the cost will stay at minimum level so that final price at Luzon will be maintained at the price level of less than 9.50 peso per kg.

Table 12.7.4. List of Charges in Each Component and Cost Increments

Scheme A			**Scheme B**	
Farm-gate Price	**6.00**		**Farmgate Price**	**6.00**
Truckage	0.25		Truckage	0.25
Drying Service Charge	**1.30**		Drying Service Charge	**0.80**
			Storage Charge	**0.60**
Truckage	0.80		Truckage	0.80
GenSan Port Silo+Loading	**0.30**		Gensan Loading Charge	0.12
Vessel Freight Charge	**0.56**		Vessel Freight Charge	**0.56**
Port Batangas handling charges	0.12		Batangas	0.12
Trucking to Lipa	0.20		Trucking to Lipa	0.20
Price at Customer's Place in Luzon	**9.53**		**Price at Customer's Place in Luzon**	**9.45**

In order to make bulk shipping worth investing, the net return should be more than 10% by raising freight charge. After simulation, the charge becomes 0.56 peso per kg, which is slightly higher than the price expected in the *corn story* section, but much lower than the current rate by container.

Similarly the port charge and dryer service charges are determined to balance adequate return and reasonable rate of charging level in scheme-B.

Because of the low profitability at dryer sector in the scheme-A, the rate of return is only 5%. Charges can not be increased higher than 1.30 per kg because the current charge is 1.00 peso, and even after the cost increase of diesel, the price will go up to 1.30 at highest.

The dryer charge in scheme-B is possible to reach the level of more than 10% because of the economy of scale and using rice husk as low cost fuel. Silo and loading sectors are equally better than in scheme-B. In short the scheme-B is based on the assumption that it will reach the size of volume which makes economy of scale and efficient operation, possibly by clustering farmers at 1,000 hectare, which is for production of 5,000 tons of corn.

Truck charge from farm to dryer is currently 0.25 peso per kg and from dryer to port terminal is 0.35, so total of 0.60 peso is charged. Whereas in both schemes, truck charges will increase to 0.25 and 0.80 because of fuel increase. If charges by all components increase, the result will improve the rate of return but will lose the price competitiveness in the market. Losing competitiveness leads to decrease of trade amount and eventually deteriorates the business environment of the logistics components.

As a result of these adjustments and cost estimates, total landed price in Luzon is calculated to be 9.53 peso per kg for scheme-A and 9.45 peso for scheme-B. At scheme-A the final price is slightly higher than the target price of 9.50, but the rates of return for individual components are not high enough. Whereas in the scheme-B, final price is within the target level and the rate of return is reasonably high so that it might be able to possibly attract investors.

12.7.3 Conclusion

The conclusion is to go for scheme-B which will lead to successful development by providing enough return on investors and by providing corn grains at competitive price to consumers in Luzon. In addition, farmers, traders and business operators of ships and trucks as well as dryers and port service operators are all benefited from the project.

The Department of Agriculture has been advocating farmers clustering at 1,000 ha, and this study proved the rationale of its policy by the feasibility of the scheme-B. The policy, however, was not materialized maybe because of the lack of a total logistics and marketing scheme.

In order to develop corn logistics from Mindanao to Luzon by employing bulk shipping, coordination of production, post-harvest processing and port handling should be conducted and comprehensive development is the only way to successfully realize the development scheme.

In implementation, management improvement program should be conducted for the marketing and warehouse receipt system. In coordination with these improvements, bulk shipping will be implemented and feed millers in Luzon will be encouraged to use Mindanao corn.

Table 12.7.5. Dryer Type-A: Batch Re-circulating Dryer (8 ton/Batch)

		Dryer-A	Dryer-A-2	Dryer-A-3
Specification		Single type	Twin Type	Triple Type
	Holding Capacity (ton)	8	16	24
	Electricity (KW)	16.55	33.11	49.66
	Diesel Consumption (Lr/Hr)	20.3	40.6	60.9
	Drying Air temperature	90 'C	90 'C	90 'C
	Drying rate to 14% (%/h)	2.7	2.7	2.7
	Circulation interval (hr)	1	1	1
	Duration of drying one batch (hr)	6	6	6
	Max Capacity per year	1800	3600	5400
Assumptions in Operation				
	Estimated Amount Handled/ year*	1620	3240	4860
	Annual Full Operation Days	75	75	75
Direct Operation Cost				
	Cost of Electricity=5P/Kwh *	97	194.74	292.11
	Cost of Fuel (30P/lt/h) *	716	1,433	2,149
	Cost for Drying One Batch	4,883	9,766	14,649
	Personnel Cost of operation/ year	143,319	143,319	143,319
	Personnel Cost / ton of operation	88	44	29
	Direct Operation Cost per Ton	**699**	**655**	**640**
Initial Investment Cost				
	Machine	4,000,000	8,000,000	12,000,000
	Loan Amortization (Peso/year)	598,027	1,196,053	1794079.963
	Amortization per Day at use	7,974	15,947	23,921
	Amortization per Ton at 2 shifts	340	340	340
Maintenance Cost				
	Replacement of Parts /yr (2%)	50,000	100,000	150000
	Engineering fee for maintenance	10,000	10,000	10,001
	Maintenance Cost Daily	800	1,467	2,133
	Maintenance Cost / Ton	33	31	30
	Indirect Cost /Ton	373	371	370
	Indirect Cost /Year (Cashflow Base)	658,027	1,306,053	1,954,081
	Depreciation	240,000	480,000	720,000
Life of Machine				
	Economic Life	15	15	15

Notes

1 Cost of Fuel reflect the recent high price of oil and set at 30P/ltr
2 Electricity and Fuel are computed at 85% motor efficiency.
3 It takes 6 hours to dry one batch of grain. Theoretically 4 cycle per day but practically 3 cycles only.
4 Interest of Loan 12%
5 Personnel cost is based on the following calculation where 24 hours operation with 26 days as monthly working day.

One team consists of 1 operator and 2 helpers for a 12 hour shift.

	Regular wage	Overtime	Monthly Pay	75 days operation
Operator	7,280	4,062	11,342	
Helper	4,500	2,250	6,750	
2 shifts Operation (1Op.+ 2Helprs)	32,560	17,124	49,684	143,319

Table 12.7.6. Dryer Type-B: Dryer with Bio-mass Burner for Three Batch Dryers (24-ton/batch)

		Dryer-B	Dryer-B2
Specification		Triple Dryers with Bio-mas Burner	Twin Dryers with Bio-mas Burner
	Holding Capacity (ton)	24	16
	Electricity (KW)	62.6	41.7
	Husk Consumption (kg/Hr)	300	200
	Drying Air temperature	90 'C	90 'C
	Drying rate to 14% (%/h)	2.7	2.7
	Circulation interval (hr)	1	1
	Duration of drying one batch (hr)	6	6
	Max Capacity per year	5400	3600
Assumptions in Operation			
	Estimated Amount Handled/ year*	4590	3060
	Annual Full Operation Days	75	75
Direct Operation Cost			
	Cost of Electricity=5P/Kwh *	368	245
	Haulage fee of Rice Husk	360	10
	Cost for Drying One Batch	4,369	1,533
	Personnel Cost of operation/ year	143,319	143,319
	Personnel Cost / ton of operation	31	47
	Direct Operation Cost per Ton	**213**	**143**
Initial Investment Cost			
	Machine	11,200,000	8,000,000
	Loan Amortization (Peso/year)	1,495,067	800,000
	Amortization per Day at use	19,934	10,667
	Amortization per Ton at 2 shifts	280	230
	Depreciation	672,000	
Maintenance Cost			
	Replacement of Parts /yr (2%)	150,000	100000
	Engineering fee for maintenance	10,000	10000
	Maintenance Cost Daily	2,133	1,467
	Maintenance Cost / Ton	30	31
	Indirect Cost /Ton	**310**	**261**
	Indirect Cost /Year (Cashflow Base)	**1,655,067**	**910,000**
Life of Machine			
	Economic Life	15	15

Notes: Conditions are same as Type-A

Table 12.7.7. Port Grain Terminal: Specifications and Cost Estimate

		Grain Terminal System		
Specification		Silo with loading and unloading system		
	Holding Capacity (ton)	50,000		
	Electricity (KW)	145.4	at full use	
	Max Capacity per year	250,000	by weekly vessel operation of 5000 ton	
Assumptions in Operation				
	Estimated Amount Handled/ year*	212,500	ton	Optimal capacity
	Annual Full Operation Days	300	days	25 days per month
	Productivity	300	TPH	Conveyor capacity
Direct Operation Cost				
	Regular use of Electricity (Kwh)	527	KW/Hr	
	Cost of Electricity=5P/Kwh *	9	P/ ton	
	Personnel Cost of operation/ year	597,440	Peak season 4 months & Leas 8 Mths	
	Personnel cost-Fixed Portion	358,464	Lean Season 8 Mths' salary extended to 12 Mths	
	Personnel cost-Variable portion	2.8	Half of cargo is handled by variable P cost	
		896,160	Maximum payable for personnel cost	
Initial Investment Cost				
	Bulk Receiving Facilities	20,143,200		
	Silo and related Facilities	18,178,160		
	Loading Facilities	17,038,560		
	Installation and freight etc	5,320,000		
	Loading System Investment	**60,679,920**		
	Unloading Facility	13,120,800		
	Bagging Facility	28,952,000		
	Unloading System Investment	**42,072,800**		
	Total Facility Investment	**102,752,720**		
	Initial Cost Loan Amortization	14,678,960	Peso / year	
	Amortization per Day at use	48,930		
	Amortization per Ton at 2 shifts	10		
Maintenance Cost				
	Replacement of Parts /yr (2%)	1,680,000		
	Engineering fee for maintenance	280,000		
	Maintenance Cost Daily	6,533		
	Maintenance Cost / Ton	9		
	Fixt Cost /Ton	**19**		
	Fixed Cost /Year (Cashflow Base)	**16,997,424**		
	Depreciation	**6,165,163**		
Life of Machine				
	Economic Life	15	years	

Table 12.7.8. Scheme-A Financial Performance Forecast

Profit and Loss Statement (A)			1	2	3	4	5	10	15
Cargo throughput	Ratio to Capacity		85%	90%	95%	100%	100%	100%	100%
	Throughput	ton/year	212,500	225,000	237,500	250,000	250,000	250,000	250,000
	Vessel Trip	trips/year	43	45	48	50	50	50	50
Revenue									
Local Dryer-Silo Service	1,300	P/ton	276	293	309	325	325	325	325
Port Silo & Loading	300	P/ton	64	68	71	75	75	75	75
Trucking service	800	P/ton	170	180	190	200	200	200	200
Vessel Operation	556	P/ton	118	125	132	139	139	139	139
Total Revenue			628	665	702	739	739	739	739
Expenditure									
Dryer Service : Fixed cost	28,800,000	P/Year	29	29	29	29	29	29	29
Dryer Service : Variable cost	699	P/ton	149	157	166	175	175	175	175
Port Silo/Loading:Fixed cost	26,207,443	P/Year	26	26	26	26	26	26	26
Port Silo/Loading:Variable cost	54	P/ton	12	12	13	14	14	14	14
Trucking service:Variable cost	680	P/ton	145	153	162	170	170	170	170
Vessel Operation:Fixed cost	21,114,227	P/Year	21	21	21	21	21	21	21
Vessel Operation:Variable cost	1,120,956	P/trip	48	50	54	56	56	56	56
Management fee	100	P/ton	21	23	24	25	25	25	25
Interest payment	12%		143	133	124	114	105	57	10
Total Expenditure			593	605	618	630	620	573	525
Profit Before Tax			35	60	84	109	119	166	214
Tax payment	32%		11	19	27	35	38	53	68
Net Profit After Tax		PHP Mil	24	41	57	74	81	113	145

Cash Flow Statement		Year	1	2	3	4	5	10	15
Net Cash-in			35	60	84	109	119	166	214
Depreciation			52	52	52	52	52	52	52
Interest			143	133	124	114	105	57	10
Earning Before Interest,Depreciation,Tax			230	246	260	276	276	276	752
IRR Before Debt Service	**21.1%**								

62

Section Profitability	Management fee is prorated according to the revenue size, Interest is prorated by investment								0.4
Scheme-A	IRR	Year	1	2	3	4	5	10	15
Local Dryer-Silo Service	4.7%		2	15	28	40	46	75	397
Port Silo & Loading	8.7%		4	8	12	17	18	25	98
Vessel Operation	10.5%		7	14	20	27	29	41	53
Profit Before Tax			13	37	60	84	94	141	548
Trucking service			20	21	22	23	23	23	23

Table 12.7.9. Scheme-B Financial Performance Forecast

Profit and Loss Statement (B)		Year >>	1	2	3	4	5	10	15
Cargo throughput	Ratio to Capacity		85%	90%	95%	100%	100%	100%	100%
	Throughput	ton/year	212,500	225,000	237,500	250,000	250,000	250,000	250,000
	Vessel Trip	trips/year	43	45	48	50	50	50	50
Revenue									
Dryer Service	0.80	P/kg	170	180	190	200	200	200	200
Silo Storage Service	0.60	P/kg	128	135	143	150	150	150	150
Loading Service	120	P/ton	26	27	29	30	30	30	30
Trucking service	800	P/ton	170	180	190	200	200	200	200
Vessel Operation	556	P/ton	118	125	132	139	139	139	139
Total Revenue			611	647	683	719	719	719	719
Expenditure									
Dryer Service : Fixed cost	31,584,000	P/Year	32	32	32	32	32	32	32
Dryer Service : Variable cost	213	P/ton	45	48	51	53	53	53	53
Silo At Dryer site : Fixed cost	73,294,442	P/Year	73	73	73	73	73	73	73
Silo At Dryer site : Variable cost	11	P/ton	2	3	3	3	3	3	3
Port Silo/Loading:Fixed cost	9,282,854	P/Year	9	9	9	9	9	9	9
Port Silo/Loading:Variable cost	35	P/ton	7	8	8	9	9	9	9
Trucking service:Variable cost	680	P/ton	145	153	162	170	170	170	170
Vessel Operation:Fixed cost	21,114,227	P/Year	21	21	21	21	21	21	21
Vessel Operation:Variable cost	1,118,456	P/trip	48	50	54	56	56	56	56
Management fee	100	P/ton	21	23	24	25	25	25	25
Interest payment	12%		159	148	137	125	114	57	0
Total Expenditure			564	568	572	576	565	508	451
Profit Before Tax			47	79	110	143	154	211	268
Tax payment	32%		15	25	35	46	49	67	86
Net Profit After Tax		PHP Mil	32	54	75	97	105	143	182

Cash Flow Statement		1	2	3	4	5	10	15
Net Cash-in		47	79	110	143	154	211	268
Depreciation		81	81	81	81	81	81	81
Interest		159	148	137	125	114	57	0
Earning Before Interest,Depreciation,Tax		288	309	328	349	349	349	918
IRR Before Debt Service	22.4%							

Section Profitability	After Rapayment of Loan and Management fee is prorated according to the revenue size							
	IRR by section after debt servio	1	2	3	4	5	10	15
Dryer Service	10.8%	28	39	51	62	66	87	319
Silo Storage Service	9.5%	46	53	60	68	68	68	289
Loading Service	10.7%	2	3	5	6	7	9	32
Vessel Operation	10.6%	7	14	20	27	30	41	53
Profit Before Tax		84	110	136	163	170	206	693