

**XXIX CURSO INTERNACIONAL SOBRE DESARROLLO
(ILPES, Santiago, 1988)**

**MATERIA: PROGRAMACION DE INUERSIONES
Y EVALUACION DE PROYECTOS**

**SOLUCION DEL TALLER:
EVALUACION PROYECTO QUIMICA INDUSTRIAL**

PROFESOR: IVAN SILVA LIRA

"QUIMICA INDUSTRIAL"

SOLUCION DEL CASO DE EVALUACION DE PROYECTOS CON DATOS ORIGINALES

EMPRESA QUIMICA INDUSTRIAL: CASO DE EVALUACION DE PROYECT

REQUERIMIENTOS DE INVERSION		ANO 0		ANO 1		ANO 2		ANO 3	
ITEMS	MONEDA NACIONAL	MONEDA EXTRANJERA	MON NACIONAL	MON EXTRANJERA	MON NACIONAL	MON EXTRANJERA	MON NACIONAL	MON EXTRANJERA	MON NACIONAL
INVERSION FIJA (Tangible)	1,130,000	1,890,000	1,130,000	1,890,000					
Terreno	60,000		60,000						
Edificio	90,000		90,000						
Obras Civiles	130,000		130,000						
Maquinarías y Equipos	660,000	1,890,000	660,000	1,890,000					
INVERSION FIJA (Intangible)	130,000	100,000	130,000	100,000					
Ingeniería y Supervisión	130,000		130,000						
Asistencia Técnica, Know-how		100,000		100,000					
TOTAL INVERSION FIJA	1,260,000	1,990,000	1,260,000	1,990,000					
CAPITAL DE TRABAJO	240,000	70,000			150,000	50,000	60,000	50,000	30,000
INVERSION TOTAL	1,500,000	2,000,000	1,260,000	1,990,000	150,000	50,000	60,000	50,000	30,000
		360,000		3,190,000		200,000		110,000	

FINANCIAMIENTO DE LA INVERSION

PORTES CAPITAL		FUENTE INDUSTRIAL		QUERIDA		AGENCIA INTERNAC. FINAN.		TOTAL	
ITEMS	MONEDA NACIONAL	MONEDA EXTRANJERA	MON NACIONAL	MON EXTRANJERA	MON NACIONAL	MON EXTRANJERA	MON NACIONAL	MON EXTRANJERA	MON NACIONAL
INVERSION FIJA (Tangible)	990,000	0	240,000	660,000	0	1,170,000	1,130,000	1,890,000	
Terreno	60,000								
Edificio	90,000								
Obras Civiles	130,000								
Maquinarías y Equipos	610,000		240,000	660,000		1,170,000			
INVERSION FIJA (Intangible)	0	0	0	100,000	130,000	0	130,000	100,000	
Ingeniería y Supervisión					130,000				
Asistencia Técnica, Know-how				100,000					
TOTAL INVERSION FIJA	990,000	0	240,000	760,000	130,000	1,170,000	1,260,000	1,990,000	
CAPITAL DE TRABAJO	240,000	70,000	0	0					
INVERSION TOTAL	1,230,000	70,000	240,000	760,000	130,000	1,170,000	1,260,000	2,000,000	
		1,200,000		1,000,000		1,200,000		3,500,000	

CUADRO DE PERDIDAS Y GANANCIAS DEL PROYECTO

ITEMS	ANO 0	ANO 1	ANO 2	ANO 3	ANO 4	ANO 5	ANO 6	ANO 7	ANO 8	ANO 9	ANO 10
INGRESOS	0	3,030,000	3,205,000	3,390,000	3,425,000	3,467,000	3,515,000	3,572,000	3,600,000	3,600,000	4,395,000
Ueritas (Loss)		3,030,000	3,205,000	3,390,000	3,425,000	3,467,000	3,515,000	3,572,000	3,600,000	3,600,000	3,600,000
Ualores Residuales											795,000
COSTOS	0	2,488,000	2,587,500	2,677,222	2,666,663	2,655,259	2,642,941	2,629,639	2,615,273	2,599,757	2,583,000
Costos Anuales		2,364,000	2,480,500	2,589,000	2,580,000	2,580,000	2,580,000	2,580,000	2,580,000	2,580,000	2,580,000
Costos Financieros		104,000	104,000	94,222	89,663	72,259	59,941	46,639	32,273	16,757	
UTILIDAD Operativa Impuestos	0	542,000	615,500	712,778	759,337	811,742	873,059	942,361	984,727	1,000,240	1,812,000
IMPUESTOS (40% Utilidad)	0	216,800	246,200	285,111	305,335	324,697	349,225	376,944	393,891	400,097	724,800
UTILIDAD Despues Impuestos	0	325,200	369,300	427,667	453,002	487,045	523,835	565,417	590,835	600,143	1,087,200
RELACION UTILIDADES	0	11	12	13	13	14	15	16	16	17	30

CUADRO DE FUENTES Y USOS DE FONDOS DEL PROYECTO

ITEMS	ANO 0	ANO 1	ANO 2	ANO 3	ANO 4	ANO 5	ANO 6	ANO 7	ANO 8	ANO 9	ANO 10
FUENTES	3,190,000	3,230,000	3,321,200	4,618,281	5,231,351	5,699,397	6,594,481	7,321,038	8,047,874	8,757,764	10,256,448
Ingresos		3,030,000	3,205,000	3,390,000	3,425,000	3,467,000	3,515,000	3,572,000	3,600,000	3,600,000	4,395,000
Credito Agencia Intern.Finan.	1,300,000										
Reporte Chemical	1,000,000										
Reporte Quimica Industrial	890,000										
Saldo Año Anterior		200,000	80,000	30,000	1,806,351	2,432,397	3,078,481	3,749,038	4,447,874	5,157,764	5,861,448
USOS	3,190,000	2,591,800	2,722,919	2,811,300	2,799,554	2,820,915	2,845,440	2,873,154	2,890,110	2,895,315	2,994,800
Inversion Fija											
Capital de Trabajo		200,000	80,000	30,000							
Costos Anuales (1)		2,071,000	2,170,500	2,270,000	2,270,000	2,270,000	2,270,000	2,270,000	2,270,000	2,270,000	2,270,000
Pago de la Deuda		104,000	226,219	226,219	226,219	226,219	226,219	226,219	226,219	226,219	226,219
Impuestos		216,800	246,200	285,111	305,335	324,697	349,225	376,944	393,891	400,097	724,800
SALDO Q-U	0	638,200	1,198,281	1,806,351	2,432,397	3,078,481	3,749,038	4,447,874	5,157,764	5,861,448	7,251,648

(1) Incluye Amortizacion y Depreciacion de Inversion Fija.

TASA INTERNA DE RETORNO <TIR> FINANCIERA DEL PROYECTO

CASOMEC

ITEMS	ANO 0	ANO 1	ANO 2	ANO 3	ANO 4	ANO 5	ANO 6	ANO 7	ANO 8	ANO 9	ANO 10
COSTOS TOTALES	0,150,000	2,487,800	2,456,700	2,586,111	2,573,335	2,594,697	2,619,223	2,646,940	2,663,891	2,670,097	2,994,800
Costos de Inversion	3,150,000	200,000	80,000	30,000	2,270,000	2,270,000	2,270,000	2,270,000	2,270,000	2,270,000	2,270,000
Costos de Operacion		2,071,000	2,170,500	2,270,000	2,270,000	2,270,000	2,270,000	2,270,000	2,270,000	2,270,000	2,270,000
Ingresos		216,800	246,200	286,111	303,335	304,697	349,223	376,944	393,691	400,097	724,800
FLUJO NETO	0,150,000	3,050,000	3,209,000	3,390,000	3,425,000	3,467,000	3,516,000	3,572,000	3,600,000	3,600,000	4,395,000
		542,200	706,300	804,889	851,665	872,303	896,777	925,056	936,109	929,903	1,400,200
TIR INTERN DE RETORNO											
VALOR ACTUAL NETO <122>											

TIR INTERN DE RETORNO = 21.312

VALOR ACTUAL NETO <122> = 1,342,239

TASA INTERNA DE RETORNO <TIR> FINANCIERA DE LA QUIMICA

CASOMEC

ITEMS	ANO 0	ANO 1	ANO 2	ANO 3	ANO 4	ANO 5	ANO 6	ANO 7	ANO 8	ANO 9	ANO 10
APORTE DE CAPITAL	1,000,000										
UTILIDAD NETA REFINANCIA	0	92,366	104,915	121,496	129,262	138,365	148,817	160,630	167,651	170,496	308,864
Utilidad Neta del Proyecto	0	325,200	359,300	427,667	455,002	487,046	523,606	555,417	590,806	600,146	1,087,200
Utilidad. Quimica <1000/2200>	0	147,818	167,664	194,394	206,819	221,394	238,107	257,008	269,562	272,794	494,162
Ingresos <37.52>	0	55,402	62,949	72,898	77,557	85,015	89,290	96,378	100,711	102,298	166,318
ROYALTIES NETOS REFINANCIA	0	112,500	118,750	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000
Royalties	0	180,000	190,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Ingresos <37.52>	0	67,500	71,250	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
DEPRECIACION VALOR RESIDUAL	0	142,273	142,273	142,273	142,273	142,273	142,273	142,273	142,273	142,273	503,636
Reservas Depreciacion	0	313,000	313,000	313,000	313,000	313,000	313,000	313,000	313,000	313,000	313,000
Valores Residuales	0	110,273	110,273	110,273	110,273	110,273	110,273	110,273	110,273	110,273	503,636
FLUJO NETO	<1,000,000>	347,159	365,928	388,769	396,535	405,638	416,090	427,902	435,124	437,769	937,500
TIR INTERN DE RETORNO											
VALOR ACTUAL NETO <122>											

TIR INTERN DE RETORNO = 37.282

VALOR ACTUAL NETO <122> = 1,260,365

"QUIMICA INDUSTRIAL"

ANALISIS DE SENSIBILIDAD

10% DE AUMENTO EN COSTOS Y 10% DISMINUCION EN PRODUCCION

CALENDARIO DE PAGO DE LA DEUDA: OPCION 1

ITEMS	ANO 0	ANO 1	ANO 2	ANO 3	ANO 4	ANO 5	ANO 6	ANO 7	ANO 8	ANO 9	TOTALES
PRESTAMO INICIAL	1,619,000										
SERVICIO DE LA DEUDA		129,520	301,695	315,705	299,515	280,325	267,135	250,945	234,755	218,565	2,391,360
Intereses		129,520	129,520	113,300	97,140	80,950	64,760	48,570	32,380	16,190	712,360
Amortizaciones		0	202,375	202,375	202,375	202,375	202,375	202,375	202,375	202,375	1,619,000
Saldo de la Deuda	1,619,000	1,619,000	1,416,625	1,214,250	1,011,875	809,500	607,125	404,750	202,375	0	
I VALOR FLUJO SERVICIO DEUDA = 1,619,000											

CALENDARIO DE PAGO DE LA DEUDA: OPCION 2

ITEMS	ANO 0	ANO 1	ANO 2	ANO 3	ANO 4	ANO 5	ANO 6	ANO 7	ANO 8	ANO 9	TOTALES
PRESTAMO INICIAL	1,619,000										
SERVICIO DE LA DEUDA		129,520	281,730	281,730	281,730	281,730	281,730	281,730	281,730	281,730	2,360,359
Intereses		129,520	129,520	117,345	104,192	89,969	74,680	58,084	40,192	20,669	764,359
Amortizaciones		0	152,210	164,387	177,538	191,741	207,060	223,646	241,538	260,661	1,619,000
Saldo de la Deuda	1,619,000	1,619,000	1,466,790	1,302,403	1,124,666	933,125	726,046	502,399	260,861	0	

CUADRO DE PERDIDAS Y GANANCIAS DEL PROYECTO

ITEMS	ANO 0	ANO 1	ANO 2	ANO 3	ANO 4	ANO 5	ANO 6	ANO 7	ANO 8	ANO 9	ANO 10
INGRESOS	0	2,727,000	2,882,700	3,051,000	3,082,500	3,120,300	3,164,400	3,214,800	3,240,000	3,240,000	4,114,500
Ventas (Quil)		2,727,000	2,882,700	3,051,000	3,082,500	3,120,300	3,164,400	3,214,800	3,240,000	3,240,000	3,240,000
Valores Residuales											874,500
COSTOS	0	2,554,910	2,655,457	2,741,948	2,728,974	2,714,951	2,699,828	2,689,483	2,665,832	2,646,768	2,622,400
Costos Anuales		2,425,330	2,523,895	2,622,400	2,622,400	2,622,400	2,622,400	2,622,400	2,622,400	2,622,400	2,622,400
Costos Financieros		129,520	131,562	119,548	106,574	92,551	77,428	67,083	40,432	24,368	
UTILIDAD (Antes Impuestos)	0	172,090	227,243	309,052	353,526	405,349	464,572	531,317	574,168	593,232	1,492,100
IMPUESTOS (40% Utilidades)	0	68,836	90,897	123,621	141,411	162,136	185,829	212,527	229,667	237,293	596,840
UTILIDAD Después Impuestos	0	103,254	136,346	185,431	212,115	243,213	278,743	318,790	344,501	355,939	895,260
RELACION UTILIZADAMENTE	0	4	5	6	7	8	9	10	11	11	28

CUADRO DE FUENTES Y USOS DE FONDOS DEL PROYECTO

ITEMS	ANO 0	ANO 1	ANO 2	ANO 3	ANO 4	ANO 5	ANO 6	ANO 7	ANO 8	ANO 9	ANO 10
FUENTES	3,509,000	2,947,000	3,440,774	3,887,552	4,253,601	4,672,661	5,115,095	5,594,236	6,051,660	6,502,369	7,819,799
Ingresos	1,619,000	2,727,000	2,882,700	3,051,000	3,082,500	3,120,300	3,164,400	3,214,800	3,240,000	3,240,000	4,114,500
Crédito Agencia Intern. Finan.	1,000,000										
Aporte Chemical	690,000	220,000	88,000	35,000							
Aporte Quimica Industrial			473,074	803,552	1,171,101	1,552,361	1,930,695	2,309,406	2,688,660	3,067,360	3,705,260
Saldo Año Anterior											
USOS	3,509,000	2,473,926	2,640,222	2,716,451	2,701,240	2,721,965	2,745,659	2,772,357	2,799,497	2,797,123	2,874,940
Inversión Fija	3,509,000										
Capital de Trabajo		220,000	88,000	35,000							
Costos Anuales (C)		2,081,030	2,179,595	2,278,100	2,278,100	2,278,100	2,278,100	2,278,100	2,278,100	2,278,100	2,278,100
Pago de la Deuda		104,000	281,730	281,730	281,730	281,730	281,730	281,730	281,730	281,730	281,730
Impuestos		68,836	90,897	123,621	141,411	162,136	185,829	212,527	229,667	237,293	596,840
SALDO (F-I)		473,074	803,552	1,171,101	1,552,361	1,930,695	2,309,406	2,688,660	3,067,360	3,465,246	4,944,820

TASA INTERNA DE RETORNO <TIR> FINANCIERA DEL PROYECTO

ITEMS	AÑO 0	AÑO 1	AÑO 2	AÑO 3	AÑO 4	AÑO 5	AÑO 6	AÑO 7	AÑO 8	AÑO 9	AÑO 10
COSTOS TOTALES	3,509,000	2,369,926	2,358,492	2,404,721	2,419,511	2,440,226	2,463,929	2,490,627	2,507,767	2,515,393	2,874,340
Costos de Inversión	3,509,000	220,000	88,000	39,000	2,278,100	2,278,100	2,278,100	2,278,100	2,278,100	2,278,100	2,278,100
Costos de Operación		2,081,090	2,179,595	2,278,100	2,278,100	2,278,100	2,278,100	2,278,100	2,278,100	2,278,100	2,278,100
Impuestos		68,836	90,897	123,621	141,411	162,126	186,829	212,527	229,667	237,293	536,840
INGRESOS		2,727,000	2,882,700	3,051,000	3,082,500	3,120,300	3,154,400	3,214,800	3,240,000	3,240,000	4,114,500
FLUJO NETO	3,509,000	357,074	524,208	616,279	662,989	680,064	700,471	724,173	732,233	724,607	1,239,560

TASA INTERNA DE RETORNO = 12.57%

VALOR ACTUAL NETO <12%> = 100,176

TASA INTERNA DE RETORNO <TIR> FINANCIERA DE LA CHEMICAL

ITEMS	AÑO 0	AÑO 1	AÑO 2	AÑO 3	AÑO 4	AÑO 5	AÑO 6	AÑO 7	AÑO 8	AÑO 9	AÑO 10
APORTE DE CAPITAL	1,000,000										
UTILIDAD NETA REFINADA	0	28,306	38,196	51,947	59,423	68,132	78,088	89,307	96,510	99,714	250,801
Utilidad Neta del Proyecto	0	103,254	136,346	165,431	212,116	240,203	278,740	318,730	344,501	355,979	895,260
Utilidad Chemical <1000/2200>	0	46,281	61,114	80,116	96,077	109,011	124,941	142,691	154,416	159,542	401,262
Impuestos <37.5%>	0	17,366	22,918	31,168	36,654	40,879	46,653	52,994	57,906	59,828	150,481
ROYALTIES NETOS REFINADOS	0	111,375	117,563	123,750	123,750	123,750	123,750	123,750	123,750	123,750	123,750
Royalties		178,200	188,100	198,000	198,000	198,000	198,000	198,000	198,000	198,000	198,000
Impuestos <37.5%>	0	66,825	70,538	74,250	74,250	74,250	74,250	74,250	74,250	74,250	74,250
% DEPRECIACION/VALOR RESIDUAL	0	154,325	154,325	154,325	154,325	154,325	154,325	154,325	154,325	154,325	546,302
Reservas Depreciadas		344,300	344,300	344,300	344,300	344,300	344,300	344,300	344,300	344,300	344,300
Valores Residuales											874,500
FLUJO NETO	1,000,000	294,626	310,084	300,023	307,498	346,207	356,164	367,382	374,986	377,769	920,663

TASA INTERNA DE RETORNO = 31.70%

VALOR ACTUAL NETO <12%> = 970,300

"QUIMICA INDUSTRIAL"

MACROS DE LOTUS

RESOLUCION AUTOMATICA DEL EJERCICIO

MACROS EJERCICIO EVALUACION PROYECTO "QUIMICA INDUSTRIAL"

0

\i MACRO CUADRO FINANCIAMIENTO

/rvd10..d14~d46~
/rvd26..f26~d62~
/rvf22~j58~
/rvd20~156~

0

\a MACRO VAN PRESTAMO1

/rvn66~d138~
/rvf140~ad131~/rvh140~ad132~/rvj140~ad133~/rvl140~ad134~
/rvn140~ad135~/rvp140~ad136~/rvr140~ad137~/rvt140~ad138~/rvv140~ad139~
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/rvad141~d148~

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\b MACRO VAN PRESTAMO2

/rvn66~d162~
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/rvad165~d172~

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\c MACRO CUADRO PERDIDAS Y GANANCIAS

/rvd91..x91~d189~
/rvd124..x124~d194~
/rvd166..v166~d195~

0

\d MACRO CUADRO FUENTES Y USOS

/rvf187..x187~f220~
/rvn66~d221~/rvj66~d222~
/rvd44~d223~/rvn30~f223~/rvr30~h223~/rvv30~j223~
/rvj30~d230~
/rvn30~f231~/rvr30~h231~/rvv30~j231~
/rvf126..x126~f232~
/rvf164..v164~f233~
/rvf199..x199~f234~

\e MACRO FLUJO NETO PROYECTO

/rvj30~d254~/rvn30~f254~/rvr30~h254~/rvv30~j254~
/rvf126..x126~f255~
/rvf199..x199~f256~
/rvf187..x187~f259~

0

\f MACRO CALCULO TIR FINANCIERA Y VAN PROYECTO

/rvd261~ac250~/rvf261~ac251~/rvh261~ac252~/rvj261~ac253~
/rvl261~ac254~/rvn261~ac255~/rvp261~ac256~/rvr261~ac257~
/rvt261~ac258~/rvv261~ac259~/rvx261~ac260~
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/rvac262~d264~/rfp2~d264~
{goto}ac264~@npv(0,12;ac250..ac260)~
/rvac264~d266~/rf,0~d266~

0

\g MACRO FLUJO NETO CHEMICAL

/rvj66~d284~/rvd201..x201~d289~
/rvd121..x121~d297~/rvd112..x112~d304~
/rvx190~x305~

0

\h MACRO CALCULO TIR FINANCIERA Y VAN CHEMICAL

/rvd308~ac280~/rvf308~ac281~/rvh308~ac282~/rvj308~ac283~
/rvl308~ac284~/rvn308~ac285~/rvp308~ac286~/rvr308~ac287~
/rvt308~ac288~/rvv308~ac289~/rvx308~ac290~
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/rvac292~d311~/rfp2~d311~
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/rvac294~d313~/rf,0~d313~

MACRO COMPLETO EJERCICIO EVALUACION PROYECTO "QUIMICA INDUSTRIAL"

0

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\a MACRO PROYECTO QUIMICA INDUSTRIAL
/rvd10..d14~d46~
/rvd26..f26~d62~
/rvf22~j58~
/rvd20~156~
/rvn66~d138~
/rvf140~ad131~/rvh140~ad132~/rvj140~ad133~/rvl140~ad134~
/rvn140~ad135~/rvp140~ad136~/rvr140~ad137~/rvt140~ad138~/rvv140~ad139~
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/rvad141~d148~
/rvn66~d162~
/rvf164~ad155~/rvh164~ad156~/rvj164~ad157~/rvl164~ad158~
/rvn164~ad159~/rvp164~ad160~/rvr164~ad161~/rvt164~ad162~/rvv164~ad163~
{goto}ad165~@npv(0,08;ad155..ad163)~/rf,0~ad165~
/rvad165~d172~
/rvd91..x91~d189~
/rvd124..x124~d194~
/rvd166..v166~d195~
/rvf187..x187~f220~
/rvn66~d221~/rvj66~d222~
/rvd44~d223~/rvn30~f223~/rvr30~h223~/rvv30~j223~
/rvj30~d230~
/rvn30~f231~/rvr30~h231~/rvv30~j231~
/rvf126..x126~f232~
/rvf164..v164~f233~
/rvf199..x199~f234~
/rvj30~d254~/rvn30~f254~/rvr30~h254~/rvv30~j254~
/rvf126..x126~f255~
/rvf199..x199~f256~
/rvf187..x187~f259~
/rvd261~ac250~/rvf261~ac251~/rvh261~ac252~/rvj261~ac253~
/rvl261~ac254~/rvn261~ac255~/rvp261~ac256~/rvr261~ac257~
/rvt261~ac258~/rvv261~ac259~/rvx261~ac260~
{goto}ac262~@irr(0,12;ac250..ac260)~
/rvac262~d264~/rfp2~d264~
{goto}ac264~@npv(0,12;ac250..ac260)~
/rvac264~d266~/rf,0~d266~
/rvj66~d284~/rvd201..x201~d289~
/rvd121..x121~d297~/rvd112..x112~d304~
/rvx190~x305~
/rvd308~ac280~/rvf308~ac281~/rvh308~ac282~/rvj308~ac283~
/rvl308~ac284~/rvn308~ac285~/rvp308~ac286~/rvr308~ac287~
/rvt308~ac288~/rvv308~ac289~/rvx308~ac290~
{goto}ac292~@irr(0,25;ac280..ac290)~
/rvac292~d311~/rfp2~d311~
{goto}ac294~@npv(0,12;ac280..ac290)~
/rvac294~d313~/rf,0~d313~
```