



Aalto University
School of Business

Capital Budgeting (22E12000)

Evaluating Capital Investments (B)

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Content

Intra-organizational and inter-organizational aspects in capital budgeting

Analysing foreign investments

- Challenges
- The case of International Diesel Corporation



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Intrafirm and Interfirm Capital Budgeting

Intrafirm Capital Budgeting and Complementarities

Investment bundle

Especially within a factory investments often complement and interact with each others: How will (e.g.) the investment affect other functions & departments in the company?

“The bundle is a homogeneous segment of work or product that has common elements relative to processing, material handling, tool handling etc.”

Do not try to evaluate integrated sub-investments separately, but evaluate them as an investment bundle

Interfirm Capital Budgeting and Coordination

(see Miller and O'Leary, 2005: Intel example)

Context: "Connected economy"

Investments in networks of firms and organizations are interrelated

Complementarity of investments

A lot of investment coordination required for parallel and interacting investments

Management of investment programs, not only individual investments

Coordination has not been 'successful' in telecommunication business, for example (e.g. mobile phones)

Intrafirm and Interfirm Capital Budgeting and Coordination: Intel case (1) (Miller and O'Leary, 2005)

Intel designs and manufactures microprocessors. Intel supplies microprocessors for computer system manufacturers such as Acer, Lenovo, HP, and Dell. Intel also manufactures motherboard chipsets, network interface controllers and integrated circuits, flash memory, graphics chips, embedded processors and other devices related to communications and computing.

According to their strategy, they invest - at frequent intervals and in a coordinated manner - in improved fabrication processes, new products, and enhanced manufacturing practices. They launch new families of microprocessors frequently. NPV used.

The processes of recurrent investment in both products and processes requires substantial levels of intrafirm and interfirm coordination.

Intrafirm and Interfirm Capital Budgeting and Coordination: Intel case (2) (Miller and O'Leary, 2005)

Intel collaborates closely with a range of suppliers that are investing concurrently to design more advanced equipment sets and materials.

Also, Intel's microprocessor architects seek to coordinate their designs with those of customers and firms that are investing in complementary products (e.g. Dell, HP, Acer, Microsoft).

Without complementary investments of suppliers and customers and their timing being carefully synchronized Intel would not be able to operationalize its successive generations of microprocessor technologies.

The challenge: How to align capital spending decisions across sub-units of the firm and across firms?

Intrafirm and Interfirm Capital Budgeting and Coordination: Intel Case (3) (Miller and O'Leary, 2005)

The target of the investment program in this particular case:
Shrinking the size of electronic elements

- Improved yield
- Improved clock-speed of the microprocessor

A lot of investment coordination required both intrafirm
(within Intel)

- Intrafirm technology roadmap
- Coordination of investments within the company

And interfirm

- Complementary investments made by suppliers, customers, and other complementors
- SEMATECH level technology roadmap (incl. 13 companies)
- Coordination with customer's and complementor's designs

Intrafirm and Interfirm Capital Budgeting and Coordination: Intel Case (4) (Miller and O'Leary, 2005)

The timing of the new microprocessor is critical since the new microprocessors are introduced with a relatively high price which is then reduced significantly during the product's short life cycle

Life-cycle revenue is significantly higher for Intel if its product introductions are coordinated successfully with related firms so that the whole infrastructure needed is available at the same time

Costs of the coordination failure huge (timing challenge)

Technology Roadmap (TR)

Technology roadmaps set out the shared expectations of the various groups that invest to design products (components)

A mechanism to be used for intra- & interfirm coordination of large-scale capital investment

A tentative and revisable agreement (“master plan”)

All investments have to be aligned with the Technology Roadmap

- 1) what are these products?
- 2) when will they be available?
- 3) how they will interoperate technically and economically, to achieve system-wide innovation?



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Analyzing Foreign Investments:

The Case of International Diesel Corporation

Foreign Investment Challenges

(e.g. ESH in Surinam Case in the course book; Chapter 7)

Different
accounting
standards (e.g.
asset valuation)

Transfer pricing

Differing tax
systems

Blocking funds

Exchange rate
changes

Political risks

Financing
conditions

The Case of International Diesel Corporation (Analyzing Foreign Investments)

US-IDC is considering whether to establish a diesel engine manufacturing plant in the UK

Three evaluation phases:

1. Estimating project cash flows (UK perspective)
2. Forecasting cash flows to parent
3. Estimating other cash flow effects
 - Calculation of present values
 - PARENT vs. subsidiary point of view

The Case of International Diesel Corporation: Basic Information & Assumptions

- US-IDC wants to boost its European sales of diesel engines (Exporting 20 000 engines; residual output)
- US plants producing to capacity
- Can acquire a closed plant in Manchester (UK)
- Possible to obtain a cheap loan from NEB:
 - 5- year; £5 million (\$10 million); 3%; interest payment at the end of each year; principal payment at the end of the fifth year
- Total investment (acquisition, equipment, retooling) \$50 million
- Production can start six months from the date of acquisition

The Case of International Diesel Corporation: Basic Information & Assumptions

- The parent company will charge licensing and overhead allocation fees (hereinafter royalties) equal to 7% of sales in pounds.
- The parent company will sell about 30% of the materials needed in manufacturing (billed in \$ at market price)
- IDC-US RRR is 12% for this project
- Investment horizon: 5 years + terminal value (if needed)

The Case of International Diesel Corporation: Basic Information & Assumptions

- Working capital requirements: 20% of sales
 - Cash, inventories & accounts receivables: 30% of sales
 - 10% offset by accounts payables
 - Recapture of WC not assumed at the end of the investment horizon
- Transfer price includes a 25% contribution to IDC-US
 - i.e. variable cost of production equals 75%
- Assumed tax shield benefit of interests at IDC-UK is here
\$1.4 million over the 5 years, or \$2.3 million over the 10 years (yearly PV's of “debt * interest rate * tax rate”)
- Interest subsidy: NEB loan is 7% “too cheap”
 - £5 mill. * 0,07 = 350 000 per year
 - Present value effect over the next five years \$2.7 mill.

The Case of International Diesel Corporation: Initial Investment Outlay

	£ (millions)	\$ (millions)
Plant purchase & retooling expenses	17.5	35
Equipment: from the parent (used)	2.5	5
Equipment: purchased in the UK	5	10
Working capital (from Lloyds Bank)	<u>1.5</u>	<u>3</u>
Total initial investment	£26.5	\$53

- Financing of \$50: Parent equity \$20 + parent loan \$20 & NEB loan \$10
- Depreciation for plant and equipment (£25; \$50): straight-line basis over five-year period, zero salvage value

Present Value of IDC-UK (Project Viewpoint)

	0	Y1	Y2	Y3	Y4	Y5	Y5+
A. Sales (units)		30,000	66,000	73,000	80,000	88,000	
B. Price/unit (£)		250	263	276	289	304	
C. Sales revenue (£ mill.)		7.5	17.3	20.1	23.2	26.7	
D. Variable cost/unit (£)		140	147	154	162	170	
E. Total Variable cost (£ mill.)		4.2	9.7	11.3	13.0	15.0	
F. Licensing fees & royalties (0.07*line C; £ mill.)		0.5	1.2	1.4	1.6	1.9	
G. Overhead expenses (£ mill.)		0.6	1.2	1.3	1.4	1.5	
H. Depreciation (£ mill.)		5.0	5.0	5.0	5.0	5.0	
I. Total expenses (E+F+G+H) (£ mill.)		10.3	17.1	19.0	21.0	23.3	
J. Profit before tax (C-I) (£ mill.)		-2.8	0.2	1.2	2.2	3.4	
K. UK income tax; @40% =0.4*J		0.0	0.0	0.0	0.3	1.4	
L. Net profit after tax (J-K) (£ mill.)		-2.8	0.2	1.2	1.9	2.0	

Present value of IDC-UK (Project Viewpoint)

	0	Y1	Y2	Y3	Y4	Y5	Y5+
L. Net profit after tax (J-K) (£ mill.)		-2.8	0.2	1.2	1.9	2.0	
M. Terminal value for IDC-UK [2.7*(L+H), for year 5 (£ mill.)							19.0
N. Initial investment, including working capital (£ mill.)	-26.5						
O. Working capital investment at 20% of revenue (0.2*C) (£ mill.)		1.5	3.5	4.0	4.6	5.3	
P. Required addition to working capital per year (roundings*)		1.5	1.9	0.6	0.6	0.7	
Q. IDC-UK Net cash flow (L+H+M+N-P) (£ mill.)	-26.5	0.7	3.3	5.6	6.3	6.3	19.0
<i>In Shapiro the Y1 Row Q is wrong; Let's use this, however, in the coming calculations</i>	-26.5	2.2	3.3	5.6	6.3	6.3	19.0

Present value of IDC-UK (Project Viewpoint)

	0	Y1	Y2	Y3	Y4	Y5	Y5+
Q. IDC-UK Net cash flow	-26.5	2.2	3.3	5.6	6.3	6.3	19.0
R. £ Exchange rate \$	2.00	1.96	1.92	1.89	1.85	1.82	1.82
S. IDC-UK Cash flow in M\$ (Q*R)	-53.0	4.3	6.3	10.6	11.6	11.5	34.5
T. Present value factors at 12%	1.0	0.8929	0.7972	0.7118	0.6355	0.5674	0.5674
U. Present value (S*T) (\$ mill.)	-53.0	3.8	5.0	7.5	7.4	6.5	19.6
V. Cumulative present value	-53.0	-49.2	-44.2	-36.7	-29.3	-22.8	-3.2
<i>If Tax shield of interest +1.4 M\$ & Interest subsidy +2.7M\$ (total 4.1 M\$)</i>							0.9

Estimation of Parent Cash Flows: Dividends and Fees & Royalties Received by IDC-US (M\$)

M\$	Y1	Y2	Y3	Y4	Y5	Y5+
A. IDC-UK Cash flow in M\$ (Q*R) (Line S in the previous Table)	4.3	6.3	10.6	11.6	11.5	34.5
B. Loan repayments by IDC-UK		2.9			9.3	
C. Dividends paid to IDC-US (A-B)	4.3	3.3	10.6	11.6	2.2	34.5
D. Fees and royalties (Line F in the previous Table * G), *Estimated value	1.0	2.3	2.7	3.0	3.4	15.5*
E. Withholding tax paid to England, @10% = 0.10* (C+D)	0.5	0.6	1.3	1.5	0.6	5.0
F. Net income received by IDC-US (C+D-E)	4.8	5.1	11.9	13.1	5.1	45.0
G. Exchange rates	1.96	1.92	1.89	1.85	1.82	1.82

Estimation of Parent Cash Flows: Net Cash Flows from Exports to IDC-UK

M\$	Y1	Y2	Y3	Y4	Y5	Y5+
A. Sales (units)	30000	66000	73000	80000	88000	88000
B. Components purchased from IDC- US						
1. Unit price (\$)	60.0	61.8	63.7	65.6	67.5	67.5
2. Total export revenue (A*B1) M\$	1.8	4.1	4.6	5.2	5.9	5.9
C. After-tax cash flow (0.165*B2); 25% margin * 65% = 16,5%; US corporate tax is 35%	0.3	0.7	0.8	0.9	1.0	1.0

Present Value of IDC-UK: Parent Viewpoint (M\$)

M\$	0	Y1	Y2	Y3	Y4	Y5	Y5+
A. Cash inflows							
1. Loan repayments by IDC-UK			2.9			9.3	
2. Dividends paid to IDC-US		4.3	3.3	10.6	11.6	2.2	34.5
3. Fees and royalties to IDC-US		1.0	2.3	2.7	3.0	3.4	15.5
4. Net cash flows from exports; *Estimated		<u>0.3</u>	<u>0.7</u>	<u>0.8</u>	<u>0.9</u>	<u>1.0</u>	<u>4.1*</u>
5. Total cash infows		5.6	9.3	14.0	15.4	15.9	54.1

Present Value of IDC-UK: Parent Viewpoint (M\$)

M\$	0	Y1	Y2	Y3	Y4	Y5	Y5+
A5. Total cash inflows		5.6	9.3	14.0	15.4	15.9	54.1
B. Cash outflows							
1. Plant and equipment	50						
2. Working capital	3						
3. Withholding tax (div. & royalty)		0.5	0.6	1.3	1.5	0.6	5.0
4. Total cash outflows	53	0.5	0.6	1.3	1.5	0.6	5.0
C. Net cash flow (A5-B4)	-53	5.1	8.7	12.7	14.0	15.3	49.1
D. Present-value factor at 12%	1.0	0.8929	0.7972	0.7118	0.6355	0.5674	0.5674
E. Present value (C*D)	-53	4.5	6.9	9.0	8.9	8.7	27.9
F. Cumulative present value	-53	-48.5	-41.5	-32.5	-23.6	-14.9	13.0

Value of Lost Export Sales (M\$)

M\$	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
A. Lost unit sales	20000	20000	20000	20000	20000	20000	20000	20000	20000
B. Cash flow per unit	185.4	191.0	196.7	202.6	208.7	214.9	221.4	228.0	234.9
C. Total cash flow	3.7	3.8	3.9	4.1	4.2	4.3	4.4	4.6	4.7
D. PV factor at 12%	0.7972	0.7118	0.6355	0.5674	0.5066	0.4523	0.4039	0.3606	0.3220
E. Present value (C*D)	3.0	2.7	2.5	2.5	2.1	1.9	1.8	1.6	1.5
F. Cumulative PV	3.0	5.7	8.2	10.6	12.6	14.5	16.3	18.0	19.5

The Case of International Diesel Corporation: Parent Company Approach

To be considered:

- Loan repayments
- Dividends to parent (100% of remaining cash after loan repayments)
- Fees and royalties
- Withholding taxes paid to the UK (dividends & fees/royalties)
- Earnings on export to IDC-UK (internal margin)
- Lost sales
- Tax shield benefit of interests
- Interest subsidy
- Currency exchange rates