

Intangible Asset Formations in 1986 - 88  
Oil Extraction, Mining, Quarrying and Manufacturing

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INTANGIBLE ASSET FORMATIONS IN 1986 - 88.

OIL EXTRACTION, MINING, QUARRYING AND MANUFACTURING.

In 1988 the Norwegian Central Bureau of Statistics conducted a survey among a sample of branch units in order to evaluate the extent of intangible asset formations in the oil, mining, quarrying and manufacturing industries in the years 1986 - 88.

Briefly, intangible asset formations encompasses: Investments for research and development; the development of competence in general, organization and administration, software, interior environment and health; and market investments; all of which are of non-physical character.

The survey reveals great dissimilarities among industry groups regarding giving priority to intangible investments. The manufacture of other chemical products (352), machinery (382) and electrical apparatus and equipment (383) were the largest investors of intangible assets. Those manufacturers invested almost as much intangibles as gross fixed capital. In addition, those industries spent considerably more on R & D than the others. There were low intangible investments in the manufacturing of food, beverages and tobacco; textile, wearing apparel, and leather products; wood products; paper products, printing and publishing. The intangible investments were more evenly distributed in those industries than for the large investors of intangibles. Over the three years the survey covered, the intangible investments showed greater stability than the tangible ones.

## MAIN RESULTS 1987

We can see from table 1 that the intangible investments in oil extraction, mining, quarrying and manufacturing over the three years were calculated to 6 735, 7 370 and 8 026 million kroner, respectively. The largest part of these amounts was invested by the manufacturing industry. In 1987 the intangible investments in the manufacturing industry exceeded 5,6 billion kroner, while the oil extraction, mining and quarrying industries invested 1.7 billion kroner.

The manufacturing industry invested nearly 18 000 kroner in intangible assets per employee in 1987, which equaled 36 percent of the gross fixed capital investments. For comparative reasons, if other chemical producers (352) and the electronic manufacturers (363) are excluded, the intangible investments per employee amounted to less than 14 000 kroner for the rest of the manufacturing industry.

From table 2 we can see that the intangible investments per employee in the manufacturing industry were almost 10 000 kroner in R & D, close to 2 500 kroner in the development of competence, organization and administration, close to 2 000 kroner in software, 2 500 kroner in market investments and close to 1 000 kroner in interior environment and health.

Market investments are defined as efforts of long-term character, and will therefore make up only a part of the total marketing cost. In comparison, regarding the efforts of the industries, we can see from table 3 that the total cost for marketing was as high as 29 000 kroner per employee and the physical market investments were 1 300 kroner. This may indicate that short-term marketing was given high priority. It is also possible that the respondents had problems separating short- and long-term marketing costs. It is important to stress that the low market investments also are due to the fact that purchases of establishments were not included.

The relatively capital intensive oil and gas producers (22) invested 10 percent in intangibles compared to their gross fixed capital formations. The gross fixed capital investment figures

differed from the public ones for that particular industry major group, among other things owing to the exploration cost figures omitted. The intangible investments in the oil and gas industry exceeded 104 000 kroner per employee, compared to 18 000 kroner in manufacturing.

We can see from table 2 that the oil and gas industry did not deviate much regarding the distribution of the intangible investments. That implies that the efforts were large in all areas, except for low market investments. The explanation for the relatively low market investments, is that these units are producers, which have their own enterprises or divisions handling sales, marketing and distribution.

#### THE DISTRIBUTION OF THE INTANGIBLE INVESTMENTS IN THE INDUSTRY IN 1987

Table 2 evinces that the intangible investments are distributed quite unevenly over the industries, which Swedish and USA surveys have confirmed too. The manufacture of chemicals and of chemical petroleum, coal, rubber and plastic products (industry group no. 35) and the manufacture of metal products, machinery and equipment (industry group no. 38) invested a considerable amount in intangibles, in excess of 30 000 kroner per employee, mainly between 15 000 and 23 000 kroner in R & D and between 3 200 and 6 900 kroner in long-term marketing.

In the "knowledge intensive" industries the distribution of the intangible investments were characterized by the great priority given to productivity measures and sales promotion. By "knowledge intensive" industries we mean the groups 352, 382 and 383. Of the intangible investments of the industries, which amounted to more than 7 billion kroner in 1987 (see table 1), these industries invested 567, 1 653 and 970 million kroner. These are large industry major groups, and are big intangible investors considering intangible investments per employee. Their large intangible R & D investments was the most distinguished characteristic compared to other industry major groups.

The other chemical producers (332) had a total of intangible investments per employee upwards of 80 000 kroner. This was more than the physical investments (see table 1). They invested most i all kinds of costs compared to other major groups. In R & D, only the group invested in excess of 41 000 kroner per employee. This group invested as much as 25 % of the intangibles in long-term marketing, or approximately 20 000 kroner, and as much as 73 000 kroner per employee in short-term marketing (see table 3). Considering an export share of 36 %, it is interesting to notice the foreign aimed intangible market investments of this group, which is as much as 12 500 kroner per employee (see table 3).

The electronic industry (383) invested relatively much in gross fixed capital investments. Even so, the intangible investments amounted to 44 000 kroner per employee, more than the amount spent on tangibles.

The smaller industry group of instrument producers, (385), spent almost 62 000 kroner in intangible investments per employee. More than 47 000 kroner were invested in R & D, and 10 000 kroner were invested per employee in long-term marketing, of which 7 300 kroner were aimed abroad. This group did also have high marketing costs, 56 600 kroner per employee.

The industry groups, manufacture of food, beverages and tobacco (31); manufacture of textiles, wearing apparel and leather product (32); manufacture of wood products (33) and manufacture of paper products, printing and publishing (34) invested considerably less in intangibles per employee. The intangible investments per employee of these groups were between 6 000 and 10 000 kroner. In addition, the distribution over types of intangible investments for those groups were more even than for the large intangible investors (35 and 38).

The tobacco industry did distinguish itself from the other low-investing groups with respect to intangible investments per employee, because it amounted to 23 000 kroner. This industry distinguishes itself with relatively low costs for R & D on 5 470 kroner, but great efforts were directed towards development of

competence, organization and administration and quite a considerable amount towards marketing investments. This may very well be due to the special, strategic conditions in this particular market.

#### THE FINANCING OF INVESTMENTS AND ESTABLISHMENT PURCHASES

Large parts of the physical and intangible investments were financed by own profits; from table 4 we can see 67 and 80 % respectively. Not surprisingly, in many industries liabilities were the second most important source of financing physical investments.

To a great extent, the oil industry financed the physical investments by own profits; 82 %; and only 16 % by liabilities.

The survey evinced that it was possible to finance a large part of the intangible investments by liabilities and government subsidies. The industry group, the manufacture of fabricated metal products, machinery and equipment (38) financed as much as 14 - 16% of their large intangible investments by liabilities.

#### ABOUT THE SURVEY

The Central Bureau of Statistics has examined the extension of intangible investments in a sample of 612 branch units, distributed by different employment limits. A branch unit consists of all establishments belonging to the same major industry group in one enterprise (three-digit code in the Standard Industrial Classification).

Intangible investments are costs of long-term real economic character with an element of novelty. It does not include cost for ongoing activities nor activities which involve changes in the stock of "traditional" real capital. ] The survey encompasses cost for such purposes, carried out in the unit internally and purchase from consultants externally.

The main problem with this survey of intangible investments is that most establishments do not record the costs with any specification

in separate own accounts. Accordingly, the respondents had problems answering the questionnaire. Some did not understand the definitions. This created difficulties for the respondents, and resulted in an element of further uncertainty than reasonable for the inflation of figures. This is particularly the case with market investments; being extremely uncertain, and therefore need to be interpreted in relation to the total marketing costs.

The most establishments being selected, have an employment of 70 persons, but with upper and lower limits of 150 and 20, respectively.

Excess representation is made by lowering the limits of employees under 70 in some major groups. This is influenced by observations made in Sweden and USA: The largest intangible investors are highly exposed of competition, are big in the terms of sales, employment and/ or profitability and are "knowledge intensive" producers.

For this reason, the major groups, 31, 34, 35 and 38 were excessively represented in the selection because all units with more than 20-50 employees have been chosen.

The sample was drawn in 1987, and the coverage of employment was calculated for this year. It was estimated by calculating the sample's share of the employment in the total population for each major group.

While inflating the figures, it was assumed that the costs per employee in each major group were the same, regardless of the size of the unit. We estimated the totals by the employment coverage, to level out the skewedness due to the stratified sample.

The intangible investments ( and the other items in the survey) are also calculated in the same way, and will digress from the units in the official Industry Statistics.

The respondents were requested to estimate the costs for 1988. Because the percentage of replies were lower in 1988, the items of absolute numbers will systematically have been underestimated and doubtful for this year. Therefore we have made tables based on

identical respondent units over the three years. Notwithstanding,  
the different relative estimates must be assumed as propitious.



TABLE 1. INTANGIBLE ASSET FORMATIONS. IDENTICAL UNITS. TOTAL.

INDUSTRY MAJOR GROUP/ CHARACTERISTICS	NUMBER OF BRANCH-UNITS	COVERAGE (EMPLOYMENT)	GROSS FIXED INVESTMENTS TOTAL	INVESTMENTS PER EMPLOYEE	INTANGIBLE INVESTMENTS TOTAL	INVESTMENTS PER EMPLOYEE	RELATIVE TO GROSS FIXED INVESTMENTS
		Percent	I	1 000 NOK.		I	Percent
<b>2,3 OIL EXTRACTION, MINING, QUARRYING AND MANUFACTURING</b>							
1986 .....	494		31 695 059	93	6 734 954	20	21
1987 .....	494	38	32 300 597	95	7 370 115	22	23
1988* .....	494		31 189 016	94	3 325 724	11	26
<b>22 Crude petroleum and natural gas production</b>							
1986 .....	9		15 210 353	1 111	1 589 504	176	10
1987 .....	9	65	16 402 986	1 006	1 702 213	104	10
1988* .....	9		16 829 623	993	1 666 726	98	10
<b>3 MANUFACTURING</b>							
1986 .....	479		15 469 425	49	5 114 590	16	33
1987 .....	479	37	15 478 098	49	5 637 594	18	36
1988* .....	479		13 965 250	45	6 328 623	21	45
<b>31 Manufacture of food, beverages and tobacco</b>							
1986 .....	69		2 232 115	41	261 457	5	12
1987 .....	69	31	2 780 472	51	332 092	6	12
1988* .....	69		2 656 815	49	473 946	9	18
<b>32 Manufacture of textiles, wearing apparel and leather products.</b>							
1986 .....	37		316 150	22	71 454	5	23
1987 .....	37	35	214 310	16	92 899	7	43
1988* .....	37		521 172	41	78 060	6	15
<b>33 Manufacture of wood products</b>							
1986 .....	19		836 121	27	148 461	5	18
1987 .....	19	16	1 147 910	37	205 475	7	18
1988* .....	19		940 765	31	208 905	7	22
<b>34 Manufacture of paper products, printing and publishing</b>							
1986 .....	49		2 266 530	65	280 893	8	12
1987 .....	49	40	2 715 540	79	331 429	10	12
1988* .....	49		1 942 603	58	308 788	9	16
<b>35 Manufacture of chemicals and of chemical petroleum, coal, rubber and plastic products</b>							
1986 .....	55		2 395 226	93	759 148	29	32
1987 .....	55	56	2 396 865	92	855 369	33	36
1988* .....	55		2 725 058	105	1 000 973	39	37
<b>352 Manufacture of other chemical products</b>							
1986 .....	15		570 453	82	497 721	71	37
1987 .....	15	56	501 689	71	566 567	81	13
1988* .....	15		979 989	135	685 253	25	20
<b>353 Petroleum refining</b>							
1986 .....	2		:	595	:	35	6
1987 .....	2	46	:	280	:	30	14
1988* .....	2		:	316	:	40	13

TABLE 1. INTANGIBLE ASSET FORMATIONS. IDENTICAL UNITS. TOTAL.

INDUSTRY MAJOR GROUP/ CHARACTERISTICS	NUMBER OF BRANCH-UNITS	COVERAGE (EMPLOYMENT)	GROSS FIXED INVESTMENTS		INTANGIBLE INVESTMENTS		RELATIVE TO GROSS FIXED INVESTMENTS
			TOTAL	PER EMPLOYEE	TOTAL	PER EMPLOYEE	
		Percent	[	1 000 NOK.			[ Percent
36 Manufacture of mineral products							
1986 .....	17		917 299	80	121 492	11	13
1987 .....	17	42	1 168 176	102	126 046	11	11
1988* .....	17		1 238 299	110	141 336	13	11
37 Manufacture of basic metals							
1986 .....	20		2 296 860	88	246 379	9	11
1987 .....	20	68	1 309 645	52	290 512	11	22
1988* .....	20		1 045 225	42	300 955	12	29
38 Manufacture of fabricated metal products, machinery and equipment							
1986 .....	206		4 312 539	36	3 119 715	26	72
1987 .....	206	33	3 658 444	31	3 315 391	28	91
1988* .....	206		2 799 608	25	3 725 222	33	133
382 Manufacture of machinery							
1986 .....	65		1 890 988	45	1 502 242	36	79
1987 .....	65	45	1 362 017	33	1 452 688	40	121
1988* .....	65		1 105 862	29	1 858 937	48	168
383 Manufacture of electrical apparatus and equipment							
1986 .....	65		842 071	38	921 650	41	109
1987 .....	65	32	766 262	34	970 046	44	127
1988* .....	65		586 490	27	1 108 103	51	189
385 Manufacture of professional and scientific instruments, photographic and optical goods							
1986 .....	9		30 240	18	115 046	69	380
1987 .....	9	32	27 956	16	105 462	62	377
1988* .....	9		37 021	23	115 056	72	311
39 Other manufacturing industries							
1986 .....	7		96 585	31	105 591	34	109
1987 .....	7	34	86 514	27	88 341	28	102
1988* .....	7		95 705	31	90 438	29	94

TABLE 2. INTANGIBLE INVESTMENTS PER EMPLOYEE DISTRIBUTED ON GROUPS OF EXPENSES. KRONER.

INDUSTRY MAJOR GROUP/ CHARACTERISTICS	TOTAL	RESEARCH AND DEVELOP- MENT	DEVELOPMENT OF COMPETENCE, ORGANISATION AND ADMINISTRATION	DEVELOP- MENT OF SOFTWARE	MARKET INVEST- MENTS	INTERIOR ENVIRONMENT AND HEALTH INVESTMENTS
2,3 OIL EXTRACTION, MINING, QUARRYING AND MANUFACTURING 1987 .....	21 650	12 492	3 117	2 416	2 455	1 170
22 Crude petroleum and natural gas production beverages a .....	17 723	9 733	2			
beverages a .....	17 723	9 733	2 475	1 933	2 552	1 03
beverages a .....	17 723	9 733	2 475	1 933	2 552	1 030
31 Manufacture of food, beverages and tobacco 1987 .....	6 062	1 167	1 635	1 270	1 215	755
314 Manufacture of tobacco products 1987 .....	23 092	5 470	5 827	2 631	8 308	853
32 Manufacture of textiles, wearing apparel and leather products, 1987 .....	6 749	1 650	1 167	835	2 522	575
33 Manufacture of wood products 1987 .....	6 556	2 181	1 499	1 362	756	759
34 Manufacture of paper products, printing and publishing 1987 .....	9 611	1 355	2 783	2 901	1 117	1 455
35 Manufacture of chemicals and of chemical petroleum, coal, rubber and plastic products 1987 .....	32 816	15 712	5 414	3 069	6 859	1 762
352 Manufacture of other chemical products 1987 .....	80 513	41 571	12 154	4 700	20 377	1 711
353 Petroleum refining 1987 .....	38 625	3 459	8 637	11 532	12 397	2 597
36 Manufacture of mineral products 1987 .....	10 995	4 195	1 875	1 284	2 471	1 170
37 Manufacture of basic metals 1987 .....	11 445	6 079	2 109	1 685	528	1 044
38 Manufacture of fabricated metal products, machinery and equipment 1987 .....	28 237	19 264	2 684	2 746	3 155	988
382 Manufacture of machinery 1987 .....	39 846	29 016	3 191	2 282	4 444	913
383 Manufacture of electrical apparatus and equipment 1987 .....	43 592	31 197	3 834	3 872	3 542	147
385 Manufacture of professional and scientific instruments, photogra- phic and optical goods 1987 .....	62 183	47 870	2 824	531	10 152	805
39 Other manufacturing industries 1987 .....	27 563	6 274	2 207	459	17 876	748

TABLE 3. RESEARCH AND DEVELOPMENT AND MARKETING COSTS PER EMPLOYEE. KRONER.

INDUSTRY MAJOR GROUP/ CHARACTERISTICS	EKS- PORT- SHARE	RESEARCH AND DEVELOPMENT		MARKE- TING COSTS TOTAL	DOMESTIC MARKET INVESTMENTS			
		PHYSI- CAL	INTAN- GIBLE		PHYSICAL TOTAL	TOTAL	AIMED DOMES- TIC	AIMED ABROAD
2,3 OIL EXTRACTION, MINING, QUARRYING AND MANUFACTURING								
1987 .....	44	1 490	12 492	27 608	1 203	2 455	1 182	1 273
22 Crude petroleum and natural gas production								
1987 .....	82	4 254	70 301	5 176	-	1 415	943	472
3 MANUFACTURING								
1987 .....	32	1 373	9 733	29 231	1 287	2 512	1 216	1 336
31 Manufacture of food, beverages and tobacco								
1987 .....	7	698	1 167	37 213	867	1 215	839	375
314 Manufacture of tobacco products								
1987 .....	8	-	5 470	55 055	-	8 308	1 904	6 405
32 Manufacture of textiles, wearing, apparel and leather products.								
1987 .....	34	401	1 650	18 187	663	2 522	1 479	1 043
33 Manufacture of wood products								
1987 .....	14	28	2 181	36 285	78	756	451	305
34 Manufacture of paper products, printing and publishing								
1987 .....	28	345	1 355	40 163	195	1 117	895	222
35 Manufacture of chemicals and of chemical petroleum, coal, rubber and plastic products								
1987 .....	50	3 356	15 712	33 814	1 264	6 850	3 105	3 754
352 Manufacture of other chemical products								
1987 .....	36	5 287	41 571	72 964	3 912	20 377	7 803	12 574
353 Petroleum refining								
1987 .....	60	-	3 459	23 065	3 459	12 397	12 397	-
36 Manufacture of mineral products								
1987 .....	8	299	4 195	28 977	21 453	2 471	2 384	87
37 Manufacture of basic metals								
1987 .....	86	487	6 079	12 917	-	528	331	197
38 Manufacture of fabricated metal products, machinery and equipment								
1987 .....	32	2 354	19 264	23 432	550	3 155	1 047	2 107
382 Manufacture of machinery								
1987 .....	24	2 174	29 076	23 524	594	4 444	1 167	3 277
383 Manufacture of electrical apparatus and equipment								
1987 .....	42	4 520	31 197	39 485	861	3 548	1 624	1 918
385 Manufacture of professional and scientific instruments, photogra- phic and optical goods								
1987 .....	46	1 085	47 870	56 600	-	10 152	2 828	7 324
39 Other manufacturing industries								
1987 .....	39	165	6 274	58 511	-	17 675	11 165	6 710

TABLE 4. FINANCING DIFFERENT TYPES OF INVESTMENTS AND ESTABLISHMENT PURCHASES. PERCENT. 1987

WAYS OF FINANCING	KINDS OF ASSET FORMATIONS			
	PHYSICAL -		INTANGIBLE INVESTMENTS	
		R & D	Market- investments	Others
<b>2.3 OIL EXTRACTION, MINING, QUARRYING AND MANUFACTURING</b>				
TOTAL in 1,000 NOK.	34 506 404 100	4 252 615 100	1 137 360 100	2 231 859 100
Self financing	67	80	78	90
External emitted equity	3	3	-	-
Subsidies from group companies	4	4	8	3
Government subsidies	1	2	1	1
Liabilities	25	8	10	6
Elsewhere	1	4	-	-
<b>22 CRUDE PETROLEUM AND NATURAL GAS PRODUCTION</b>				
TOTAL in 1,000 NOK.	17 710 892 100	1 146 540 100	31 876 100	533 296 100
Self financing	82	91	100	96
External emitted equity	2	-	-	-
Subsidies from group companies	-	9	-	4
Government subsidies	-	-	-	-
Liabilities	16	-	-	-
Elsewhere	-	-	-	-
<b>31 MANUFACTURE OF FOOD, BEVERAGES AND TOBACCO</b>				
TOTAL in 1,000 NOK.	3 084 962 100	64 160 100	247 127 100	201 159 100
Self financing	60	94	63	97
External emitted equity	4	-	-	-
Subsidies from group companies	7	-	36	1
Government subsidies	-	3	-	-
Liabilities	24	-	-	1
Elsewhere	5	3	1	-
<b>35 MANUFACTURE OF CHEMICALS AND OF CHEMICAL PETROLEUM, COAL, RUBBER AND PLASTIC PRODUCTS</b>				
TOTAL in 1,000 NOK.	2 533 625 100	409 536 100	188 822 100	267 051 100
Self financing	49	93	88	88
External emitted equity	1	-	-	1
Subsidies from group companies	12	4	2	6
Government subsidies	-	1	-	-
Liabilities	33	-	10	3
Elsewhere	5	1	-	2
<b>38 MANUFACTURE OF FABRICATED METAL PRODUCTS, MACHINERY AND EQUIPMENT</b>				
TOTAL in 1,000 NOK.	4 002 481 100	2 261 882 100	455 006 100	683 125 100
Self financing	60	71	74	85
External emitted equity	8	5	9	1
Subsidies from group companies	3	1	1	3
Government subsidies	1	1	-	1
Liabilities	28	14	16	12
Elsewhere	1	7	-	-