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Geir Frengen, Frank Foyn and Richard Ragnarsøn

Innovation in Norwegian Manufacturing and Oil Extraction in 1992

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Summary

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Statistics Norways' first survey of innovative activities reveals that enterprises in Norwegian manufacturing and oil extraction invested NOK 11,6 billion in developing new or changed products and production processes during 1992. Of this amount the enterprises bought services from other enterprises for their creative development for more than NOK 3 billion. Research and development (R&D) constituted the largest share of the innovative activities. Oil extraction, mineral products, electronics and machinery industries did the lion's share of the development of products and processes.

An outcome of these investments in innovative inputs was that changed products made up 22 per cent of the turnover in manufacturing, and domestic sales included a higher share of product innovations than exports did.

Relatively few of the smaller enterprises reported any innovations, but these small innovators obtained a higher share of changed products than the large ones. The large enterprises innovated intensively measured by innovation costs per employee and by investing a large proportion of their total fixed capital formations in innovative purposes. The small innovative enterprises allocated more than the larger ones to other innovative activities than R&D, and they also spent relatively more on marketing than R&D.

Quality improvement, increasing market shares and reducing production lead times were the most important objectives of the innovative activities. Customer contact and internal information sources were vital to this process. Economic factors such as high costs and excessive perceived risks hampered innovative activities mostly.

Subject words: Development, innovation, invention, product change, quality improvement, R&D, research

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Introduction

In 1993 Statistics Norway carried out an innovation survey in collaboration with a reference group with participants from the STEP Group (Studies in Technology, Innovation and Economic Policy), the Confederation of Norwegian Business and Manufacturing (NHO), the Research Council of Norway (NFR) and the Ministry of Industry and Energy. The reference group was particularly involved in the planning and preparatory work and NHO and NFR contributed to the financing of the survey.

What are innovative activities and innovations?

The survey measured technological innovation in Norwegian manufacturing. The concept of technology has been extended to include not only equipment, but also knowledge and competence necessary to develop and manufacture a product. Innovative activities are creative development in a wide sense, which have the objective of developing products and production processes. When an industry implements a new or improved manufacturing technology or introduces a new or changed product in the market, an innovation appears.

A traditional model for the innovative process is the linear one, which starts off with research leading to inventions which again lead to new products or manufacturing technologies. However, the innovative activities are a complex interactive process, where ideas are discussed between the actors involved in research, manufacturing and market.

Research and development (R&D) is the most vital activity and a reliable input indicator on innovation. Other innovative activities apart from R&D is technology collaboration and transfer, product design, trial production and manufacturing start-up, development of human capital at all organisational levels of the manufacturing process, acquisitions of patents and licences, market analyses, contact with customers and users etc.

The Oslo Manual's[1] § 50 describes this as follows: "Innovation consists of all those scientific, technical, commercial and financial steps necessary for the successful development and marketing of new and improved manufactured products, the commercial use of new or improved processes or equipment or the introduction of a new approach to a social service. *R&D is only one of these steps*".

Innovation is the objective and main result of these activities. An innovation is present when new or radically improved processes or products, in construction or performance, become commercialized. (Aesthetic changes or product differentiations are not defined as innovations.) In other words, there is an innovation only when the market "buys" it. This occurs when the invention, the patent, the licence or new or improved processes are used in commercial production or when a new or changed product is introduced in the market.

The purpose of the survey

Innovative activities are important incentives for economic growth and development in the industry. The creation of new or radically improved products and processes implies developing knowledge, competence and equipment. Development and commercialization of new products and processes are vital to productivity and turnover in the individual enterprise and manufacturing as a whole. An important objective for the survey was to gain a better understanding of innovative activities.

Statistics covering creative development are vital for analysing industries' competitive ability and growth. Industry associations and the authorities are obtaining an opportunity to evaluate the industrial and research policies. This will also provide the enterprises with a possibility of comparing themselves with others.

The opportunity for international comparisons was also an incentive to conduct the innovation survey. Corresponding

[1] OECD Proposed Guidelines for Collecting and Interpreting Technological Innovation Data - Oslo Manual, OECD, Paris 1992

surveys were executed in the EU, certain EFTA countries, North America and Australia. The preliminary results of the international comparisons are expected to be published by the end of 1995.

The survey was accomplished in close collaboration with Eurostat and their innovation project[2]. The questionnaire we used, and the information we requested, were designed according to a standard prepared[3] by Eurostat and OECD, based on the Oslo Manual. The aspects of international comparisons influenced the choice of unit and sample as well.

The survey mapped the extent of and activities associated with creative development which had innovation as an objective, even if the outcome of the innovative activities were not yet commercialized nor maybe ever would, for practical reasons (see Chapter 2).

In addition, an objective of the survey was to scrutinize the type of enterprises and industries which were particularly innovative as well as factors either promoting or hampering these activities. Aspects initiating innovative activities were studied by type of R&D cooperation, technology transfer and the connection of the enterprise to a consolidated concern. The importance of the various information sources of innovative ideas, participation in research council programmes, public R&D contracts and reception of grants and public finance for such activities were also mapped.

We studied inputs for innovation by operating and investment costs connected to activities of creative development. Operating costs were allocated on services contracted externally and activities carried out internally, such as R&D, product design, trial production and manufacturing start-up, the purchase of patents, licences and market analyses.

An output indicator on product innovation, an outcome of the innovative efforts, was surveyed. We did that by asking the enterprises to distribute the sales in 1992 by significantly changed, incrementally changed and essentially unaltered products during 1990-92. Product innovation was also studied by asking the enterprises to distribute the turnover by the various phases of the products life-cycle in the market.

Statistics Norway has previously conducted surveys of intangible investments[4] and research and development (R&D)[5], which are other input indicators on innovation. The innovation survey fits into these series of investigation of technological innovation, and some of the experiences and elements from the survey are used in the 1993 R&D survey.

[2] Eurostat's innovation project, CIS (Community Innovation Survey) comprised all member states and was conducted in the same period as ours.

[3] Our form is almost identical with "E.C. Harmonized Innovation Surveys 1992/1993-Final Questionnaire".

[4] Surveys of intangible investments 1988 and 1990

[5] The R&D surveys are conducted every two years.

1 Survey methodology

The innovation survey was perfomed in 1993, and some main results were presented in our weekly publication in March 1994 (Ukens statistikk 10/94). We studied innovative activities in 1992 for a sample of Norwegian enterprises in oil extraction, mining and manufacturing which introduced product and process innovations in 1990-92. The survey was a voluntary questionnaire survey, combined with interviews and clarifications by telephone in connection with the review of the responded items. In a separate attachment the survey questionnaire is presented.

Unit

In the innovation survey we observed the enterprise, which is any operations organised by the same owner in an institutionally legal entity. The sample for the survey was drawn from the enterprise register of Statistics Norway.

An enterprise consists of one or several branch units and establishments. An establishment is a geographically located unit where the main activity is limited to one industry subgroup, and this is the smallest unit used in manufacturing statistics. A branch unit comprises all the establishments in the enterprise whose activities are in the same industry, and might therefore not be of unambiguous geographic location. If an enterprise consists of only one establishment, then establishment, branch unit and enterprise will be the same unit. An enterprise with establishments in different industries consists of several branch units.

The choice of observing the enterprise implies that multi-unit enterprises with activities in several industries, have all their innovative activities registered in the industry in which the main activity takes place. This is not favourable to the largest industrial enterprises with considerable innovative activities in several industries.

However, the enterprise was selected as the observation unit of two reasons: It is precisely defined; and in multi-unit enterprises it is difficult or impossible to distinguish innovative activities for any smaller units. Other countries conducted innovation surveys based on the enterprise as well[6]. In the survey of intangible investments and R&D, however, branch unit is observed, while establishment is studied in the manufacturing statistics.

Sample

We decided not to limit the survey to large enterprises, because it was of profound interest to study the importance of small and medium sized enterprises (SME) in manufacturing as regards innovative activities and innovation. By ensuring a reasonable representation of smaller enterprises we would obtain a better experience and decision basis for industry and research policies towards SME.

The population consisted of enterprises with at least five persons engaged in industries related to oil extraction, mining and manufacturing. In a census survey more than 80 per cent of the enterprises would have had less than 50 persons engaged. The population was stratified into four employment classes and the gross sample was drawn with the following probabilities:

Persons engaged:	5-9	10-49	50-99	100-
Enterprises in the population	1 989	2 639	491	487
Sampling fraction	20	30	50	100

The gross sample consisted of 1 902 enterprises in Norwegian oil extraction, mining and manufacturing. The gross sample's share of the population was 34 per cent of the enterprises (1 902 of 5 606), representing 78 per cent of all persons engaged.

The sample was stratified by including all enterprises with at least 100 employees, 50 per cent of the enterprises with 50-99 employees, 30 per cent of the enterprises with 10-49 employees and 20 per cent of the enterprises 5-9 employees.

[6] See R&D and Innovation Statistics - Fourth EC-EFTA Joint Working Party Meeting

In order to analyze small and medium size enterprises, we designed the gross sample such that 60 per cent of the enterprises had less than 50 persons engaged.

Response rate

Size-classes.	Gross sample	Response-rate	Coverage rate by persons engaged. Percentage	
Persons engaged	Enter-prises		Gross sample	Net sample
Total	1 902	52	78	48
5- 9	388	51	20	11
10- 19	412	51	28	15
20- 49	364	52	31	16
50- 99	251	50	49	25
100-199	245	52	100	52
200-	242	56	100	66

The participation in the survey was 986 enterprises or 52 per cent of the gross sample, following two reminders. This net sample covered 48 per cent of the employees and 18 per cent of the enterprises in the population. From the table we note that the response rate varied insignificantly over the size classes. However, enterprises with at least 200 persons engaged had a slightly higher response rate (56) than the smaller ones.

The coverage rate indicates the sample's share of the population in terms of persons engaged. The enterprises which participated in the survey covered nearly half the number of employees in manufacturing. Increasing coverage rate over the size classes in spite of relatively similar response rates, are due to the fact that the sampling fractions increased with size classes.

The main reason for the low response rate compared to Statistics Norway's mandatory surveys of R&D and intangible investments, is that the innovation survey was voluntary. Some other factors did also influence the response rate and the quality of the response.

Survey of non-response

In the gross sample 48 per cent of the enterprises did not participate in the survey. Because this non-response was relatively large it was important to investigate whether there were any skewness among the non-respondents compared to the net sample. Any non-response bias would indicate that the enterprises in the net sample were not representative for the population. This would therefore have implications for the estimation of figures for the Norwegian manufacturing industry as a whole.

In May and June 1994, we conducted a survey of non-response among the enterprises that did not participate in the innovation survey. A random sample of around 20 per cent or 199 of the non-respondents was asked. Sufficient participation was vital so that the results from the non-response survey were robust for the innovation survey. In order to achieve that, the sample was made tiny, only two simple questions were asked and the surveyees was well tended with a subsequent telephone reminder. The survey of non-response achieved a response rate just over 90.

The questions relating to whether they had innovations, and whether they had continuous R&D activities during the survey periods, were put in the same manner both in the non-respondents and in the innovation surveys. The question about innovations was particularly important to the analysis of the whole manufacturing and for calculating population figures. The percentage distributions of enterprises with and without innovations in the two surveys are given in the table:

Size-classes.	Non-response survey. Share of enterprises		Innovation survey. Share of enterprises	
Persons engaged	With inno-vations	Without inno-vations	With inno-vations	Without inno-vations
Total	51	49	41	59
- 10	40	60	16	84
10- 49	36	64	30	70
50- 99	64	36	56	44
100-	72	28	72	28

In the non-response survey 51 per cent of the enterprises said they had innovations compared to only 41 per cent in the innovation survey. Furthermore the share of small innovators differed considerably between the two surveys.

As much as 40 per cent of the smallest enterprises were innovative in the non-response survey while only 16 per cent were in the innovation surveys. Among enterprises with at least 100 employees the share of innovators was equal in the two surveys.

Fairly large variations between the two surveys when the data are distributed according to industry, are mainly attributable to the differences between large and small enterprises.

The differences between the two surveys are due to several reasons. Actual differences in innovative activities between the enterprises which participated and those which did not participate in the innovation survey might occur. In the non-response survey we simply asked a yes or no question about innovation, while a yes response in the innovation survey implied that the enterprise had to complete a comprehensive questionnaire. In order to evade any further involvement, smaller enterprises in the innovation survey could have responded no of convenience. This seems convincing as small enterprises after all do not have the same resources and capacity as do the larger ones to execute relatively complicated and time consuming tasks.

The non-response survey indicates that we have not been able to comprise all innovative activity, particularly for a number of small enterprises. This enhances the argument that surveys of innovation input indicators provide an inaccurate and biased picture of actual innovative activities and research and development etc. for small and medium size enterprises.

Estimation of innovation costs for the entire population

Total innovation costs for the entire population in oil extraction, mining and manufacturing had to be calculated as the innovation survey was a sample survey. In addition, it was necessary to calculate population figures for size classes and industries with different coverage rates in order to compare the various classes.

For the purpose of estimation we assumed that the enterprises abstaining and the residual population[7] were equal to the enterprises in the net sample with regard to innovative activities. The survey of non-response, however, revealed that the share of enterprises with innovations was higher among the smaller enterprises than in the innovation survey. In the estimation of population figures we have chosen to ignore this, because the interpretation of this and the entailing corrections following the findings from the non-response study are disputable. The non-response survey may therefore imply that innovation costs for small enterprises and then industries of many small enterprises are underestimated.

There were significant variations in innovative activities between industries and size classes according to the net sample. To achieve as homogeneous classes as possible in the calculation of population figures we therefore post-stratified the sample according to industry and persons engaged.

(The populations figures for persons engaged in each enterprise was extracted from our enterprise register.)

Innovation costs per employee in each stratum in the net sample we assumed to be equal the corresponding expected values for the population:

$$(1)\quad \frac{\hat{I}_s}{S_s} = \frac{\sum_{i=1}^{n_s} I_{s,i}}{\sum_{i=1}^{n_s} S_{s,i}}$$

s = stratum , industry and sizeclass
n_s = number of enterprises in stratum s in the net sample
$S_{s,i}$ = persons engaged in enterprise i in stratum s in the net sample
S_s = total of persons engaged in stratum s in the population
$L_{s,i}$ = innovation costs in enterprise i in stratum s in the net sample
$\hat{I}_s$ = estimated innovation costs in stratum s in the population

The net sample's share of employees in the various strata in the population, or the coverage rate:

$$(2)\quad d_s = \frac{\sum_{i=1}^{n_s} S_{s,i}}{S_s}$$

d_s = coverage rate in stratum s

The estimator for innovation costs for each individual stratum in the population will thus be:

$$(3)\quad \hat{I}_s = \sum_{i=1}^{n_s} I_{s,i} \frac{S_s}{\sum_{i=1}^{n_s} S_{s,i}} = \frac{\sum_{i=1}^{n_s} I_{s,i}}{d_s}$$

For each stratum the observed innovation costs was grossed up by the inverse of the relevant coverage rate. The net sample represents a large share of the employees in the population in the case of high coverage rate. The scaling factor is therefore small as the net sample already explains a lot about the population.

The innovation costs for oil extraction, mining and manufacturing is the sum of the estimates for each stratum:

$$(4)\quad \hat{I} = \sum_{s=1}^{m} \hat{I}_s$$

m = the number of strata

[7] Population - gross sample = residual population

2 Quality of the responses

The topic of the survey was new and the type of questions unfamiliar to some respondents. The questions were partly demanding and innovation costs could not be easily derived from the accounts.

The quality and reliability of the responses varied widely and were dependent of level of knowledge, interest and time available for the respondents. A comprehensive review of the received questionnaires was therefore necessary. The items relating to employment, investment, sales and marketing were checked against corresponding questions given in the production and accounting statistics. The R&D indicators were revised against the R&D survey for 1991. Obvious major mistakes and ambiguities were clarified with the respondents. The data were tested electronically and controlled by the preliminary table results. The quality was raised considerably following the thorough revision.

The questionnaire was based upon the EU/ OECD questionnaire except some minor changes and adaptations for national purposes. In this chapter we will explain some of the questions which are vital for the analysis and understanding of the results.

Innovation costs

We asked for total innovation costs distributed by operating and investment costs in item 4 (see questionnaire attachment). The respondents were asked to split operating costs by activities (question 4b), such as R&D, product design etc. This subdivision was made to specify innovative activities conceptually and make it more straightforward to pull these costs out. The aim of these questions was to get a quantitative measurement of, a general and detailed view of the costs and strategies of the enterprise's innovative activities.

Many respondents, however, equalled innovative activities with R&D. The distinction between R&D and other innovative activities is unclear, which is empahasized in the Oslo Manual as well. Product design, trial production and manufacturing start-up were regarded as R&D by many enterprises.

None of the enterprises specified innovation costs in the financial accounts, and an unambiguous method for determining innovation costs was not given. The Oslo Manual's § 216 describes two methods to register innovation costs in an enterprise in one period:

i) Total costs operating innovative activities
ii) Present value of costs of innovations

Method i) encompasses all the running costs of activities with the intention of innovation, irrespective of the activities are completed or successful and become commercialized in the form of an innovation, and is therefore a rough indicator.

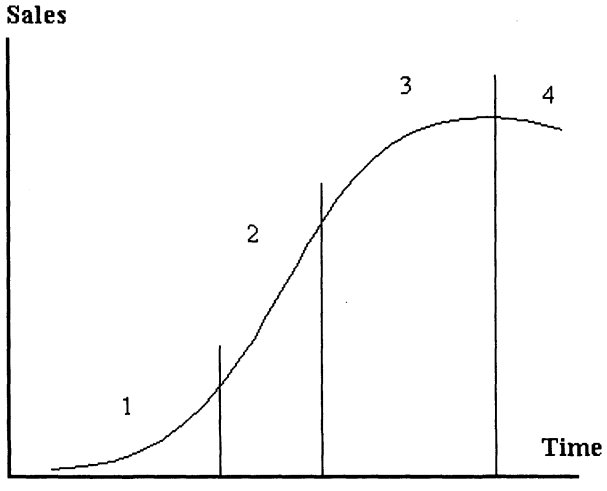
Method ii) surveys exclusively the present value of costs associated with innovations, i.e. the commercial result of innovative activities. This method solely includes costs of activities actually resulting in a new or changed product introduced in a market, or a new or changed process which has been implemented. The method is correct in a theoretical notion but probably "impossible" in practice. This kind of innovation costs accrues in several years and are therefore difficult to distinguish from other costs associated with activities where innovations are the objective, but would include unfinished and unsuccessful projects as well.

Of pragmatic considerations we therefore chose method i) as this would be simpler and more operable for the enterprises, and as this was used in the surveys in the other countries.

Output of innovative activities

By asking questions about innovation costs we obtained a measurement on the extent of innovative activities, the input indicator on innovation. Items 5 and 6 were attempts to measure the result of these activities. The enterprises were requested to divide their sales according to the novelty of their products. This were output indicators of the innovative activities, on product innovations, see definition of innovation.

In item 5 we requested the enterprises to distribute the turnover in 1992 on the various phases of the products' sales in the market. This life-cycle for the sale of a product in a market is divided into four phases: Introduction, growth, maturity and decline phases. The typical lapse of this life-cycle can be described by a s-formed curve. The time period for the sale of a product in a market runs along the x-axis, and the volume sold along the y-axis.



During the introduction phase (1) the product is launched on the market and called an innovation. The sales is often low, but increasing. The growth phase (2) is characterized by accelerating turnover. The product's sales is highest during the maturity phase (3), but the growth has evened out. The turnover falls during the decline phase (4) and the product is finally withdrawn from the market.

The sales' proportion of products in the introduction phase (SPI)[8] is an indicator of output of the innovative activities. As we assume that newly developed or changed products are found at the introduction phase of the life-cycle it is a indicator on product innovations.

The life-cycle method is not impeccable and thus a matter of dispute. The respondents had to be familiar with the life-cycle theory. The life-cycle continuum must be relevant to the enterprise's activity and they had to be able to divide the sales into the various phases. In addition, the method only encompasses product innovations. The enterprise's product ought to be an identifiable good, preferably consumer goods, being produced in series without too many small changes. For some industries, such as offshore and ship building, there are a lot of production on commission where contracts varies, and thereby also the products. For production on commission it is therefore difficult to depict the products' life-cycles. Deciding upon right phase and how long it lasted varied between the respondents and the various branches. This probably led to the relatively low item's response rate, and there is therefore an extraordinary uncertainty associated to these data.

We asked the respondents in item 6 to divide sales by products which have been significantly changed, incrementally changed and essentially unaltered during the course of 1990-1992. An indicator (PNP)[9] on respectively large and small product innovations was thus established. The enterprises regarded it easier to split the turnover according to degree of change rather than phases of the life-cycle. The item's response rate is therefore higher for item 6 than for item 5, and the PNP indicator worked better and is more reliable than the SPI indicator.

The lack of correlation between the two indicators for the scope of product innovation can be explained by products introduced in 1990 having reached their growth phase in 1992. Products which reach the growth phase during this period will be registered as product innovations in the PNP indicator as they are new, but not in the SPI indicator because they are not in the introduction phase. Further, products in the growth phase will possibly have increased their share of total sales (see the figure) and will have higher weight in the PNP indicator than products in the introduction phase. In addition newly established enterprises will only be selling new products.

Evaluation of strategies for and barriers to innovative activities

Items 14-16 surveyed objectives of, information sources for and factors hampering innovative activities. The alternatives were supposed to be graded from "not important" to "very important" according to a scale from 1 to 5 respectively. This required subjective evaluation by the respondents rather than figures extracted from a number of accounts, and were therefore plainer to answer than the costs questions. The responses provided a picture of the innovative strategies and the importance of factors which promote and limit innovative activities in the enterprises.

A mistake done by the phrasing of the questions was the lack of a zero response alternative, which would suggest: "Not relevant or not evaluated". In addition, the respondents were subjective and different "characters": Some responded to all alternatives and others only to a few; Some used the whole scale as opposed to others who answered at one end of the scale only.

[8] SPI, sales' proportion of products in the introduction phase

[9] PNP, sales' proportion of new products

3 Main results 1992

Figure 1. Enterprises with and without innovations. Size class

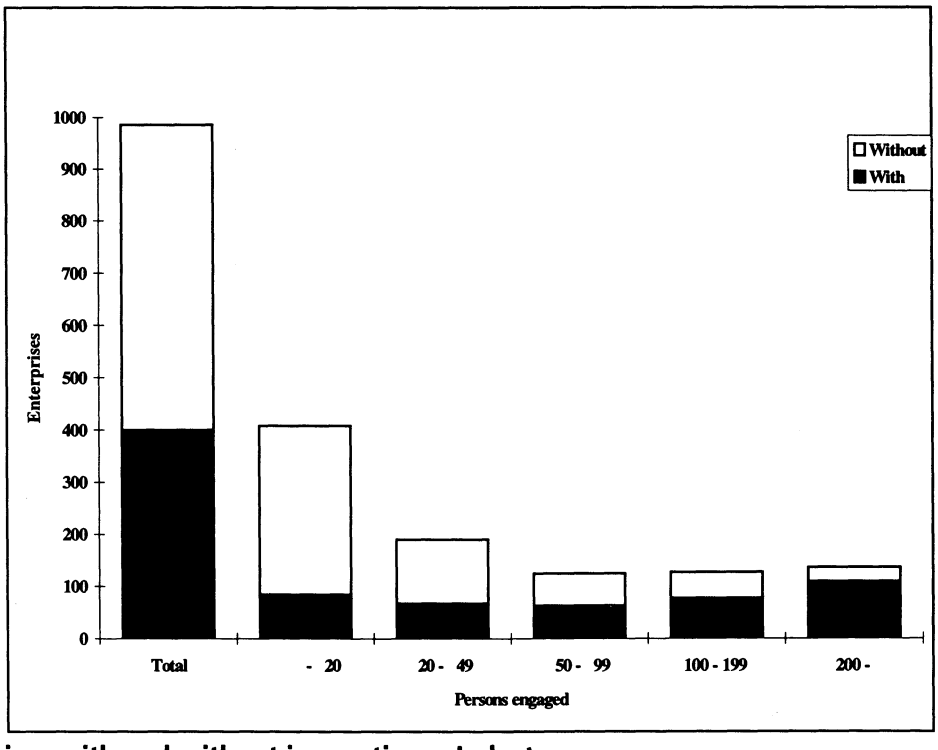


Figure 2. Enterprises with and without innovations. Industry

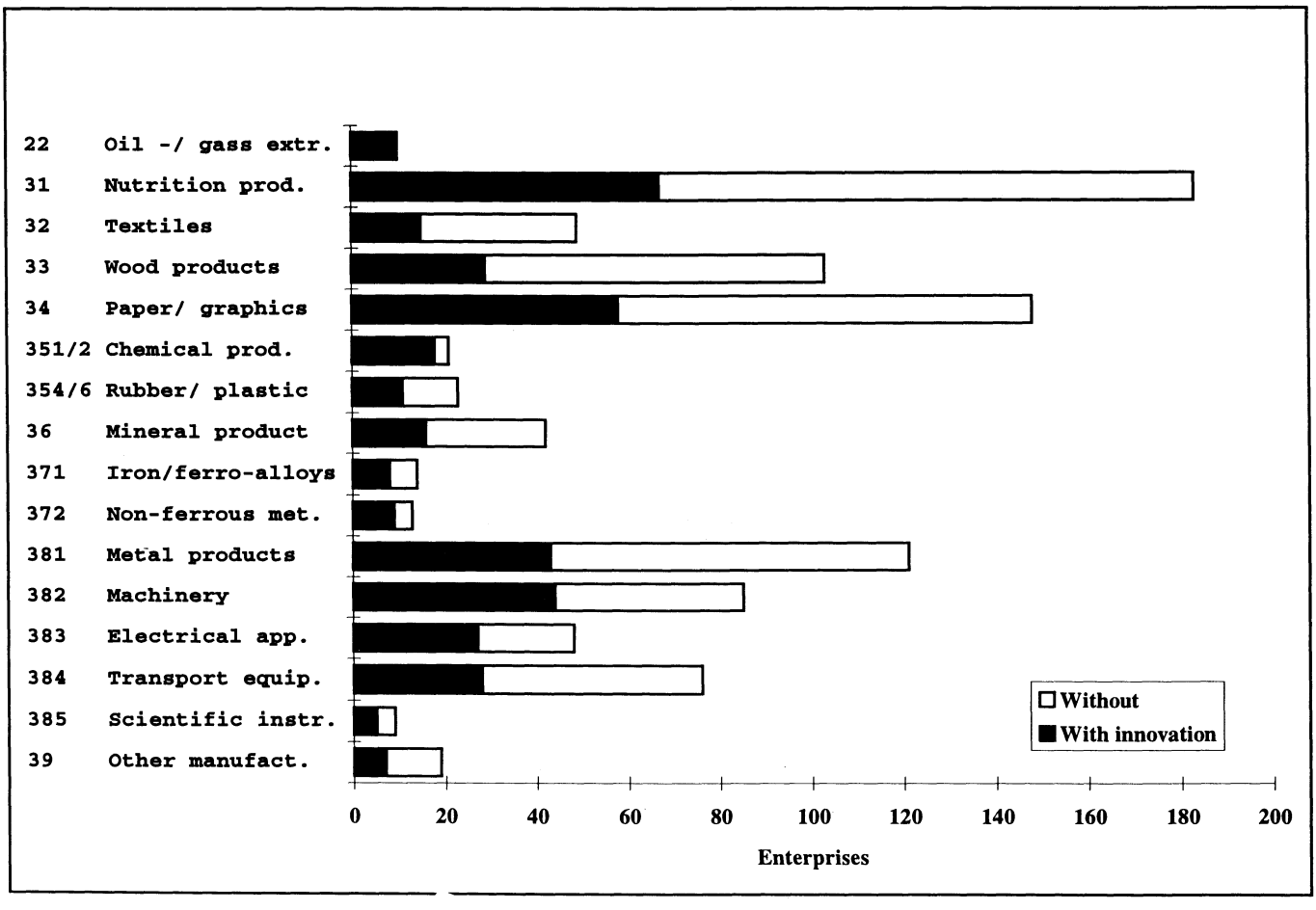
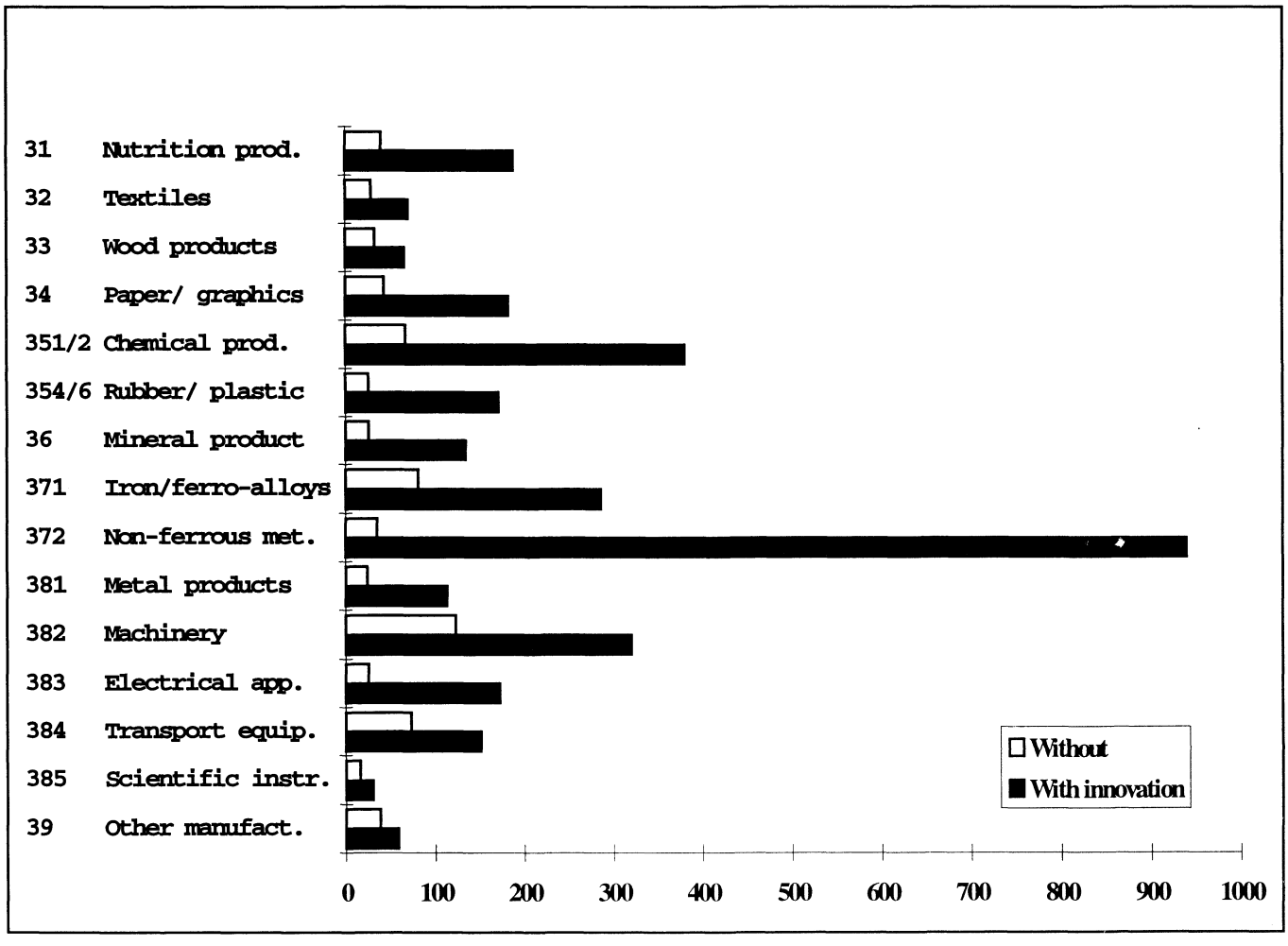


Figure 3. Persons engaged per enterprise with and without innovations. Industry



3.1 Extent of innovative activities

Of the 986 enterprises which responded, 41 per cent (400 enterprises) declared that they had introduced new or changed products or processes in the period 1990-92. The highest share of enterprises with innovations were among the largest enterprises; 80 per cent of the enterprises with at least 200 persons engaged. Among the medium sized enterprises (50-99 employees) the share was 50 per cent. Only 15 per cent of the smallest enterprises (up to 10 employees) were innovative.

High share innovators in the chemical products and electronics industries

All the enterprises in oil extraction which participated in the survey had innovations, while 40 per cent of the enterprises in manufacturing were innovative. Chemical products, non ferrous metals, electronics and machinery industries (industry major group 351/2, 372, 383 and 382 respectively in SC 83[10]) were distinguished with a very high ratio of innovative enterprises (86, 69, 56 and 52 per cent respectively). These industries were outstanding in previous surveys of R&D and intangible investments too. Large industries (in the number of enterprises and persons engaged) such as nutrition (31 in SC 83) as well as wood-processing and graphics (34 in SC 83), had also quite a few innovative enterprises, but a moderate ratio of the total number surveyed in these industries (36 and 39 per cent respectively). The textiles, wood, mineral and metal products industries (32, 33, 36 and 381 in SC 83 respectively) had undoubtedly the lowest shares of innovators.

In manufacturing the enterprises with innovations had 198 employees on average, more than four times as many as those without, which had 44 employees on average. Innovators were larger in several aspects, and had more than double of the capital formations per employee and 50 per cent higher exports than the enterprises without innovations. These characteristics applied throughout the industries.

[10] The Standard Industry Classification based upon ISIC rev. 2

Figure 4. Sales per person engaged in enterprises in manufacturing with and without innovations. Size class

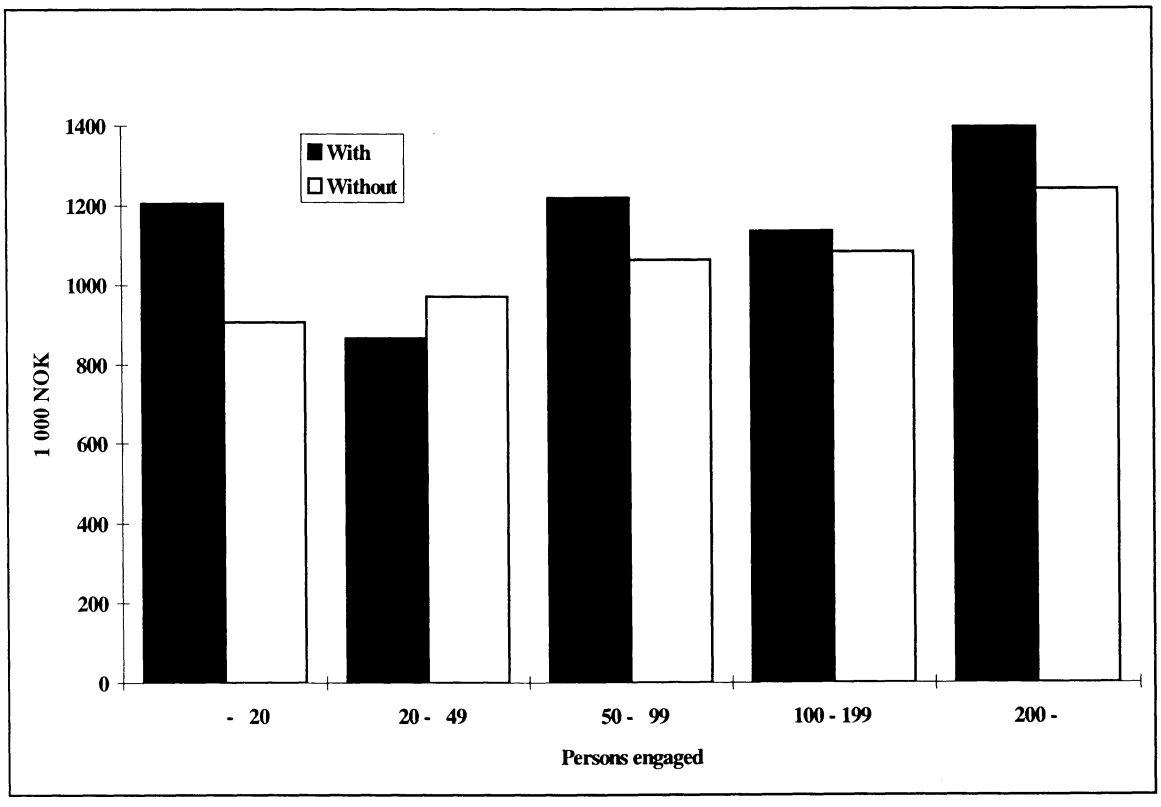


Figure 5. Sales per person engaged in enterprises with and without innovations. Industry

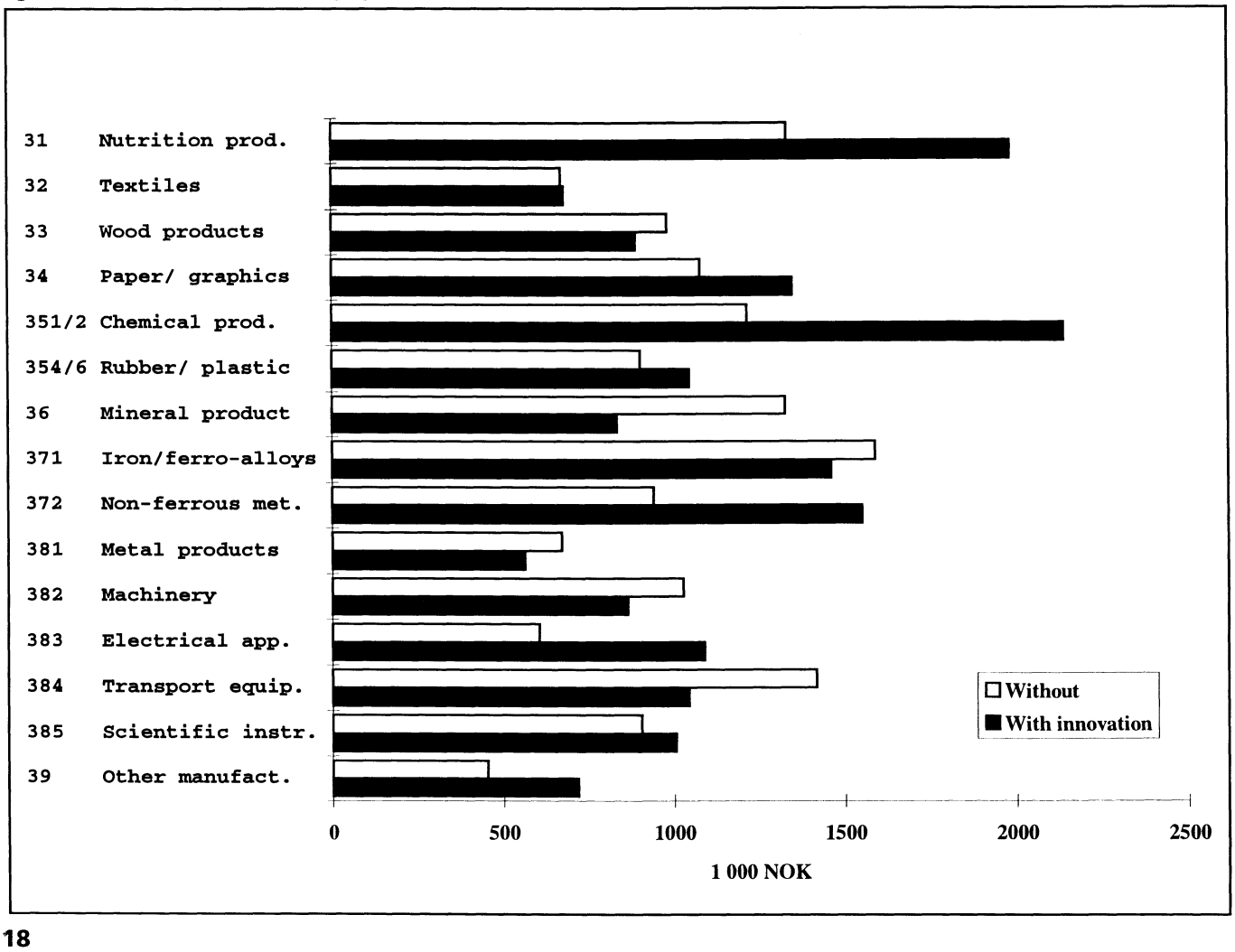


Figure 6. Export share in enterprises in manufacturing with and without innovations. Size class

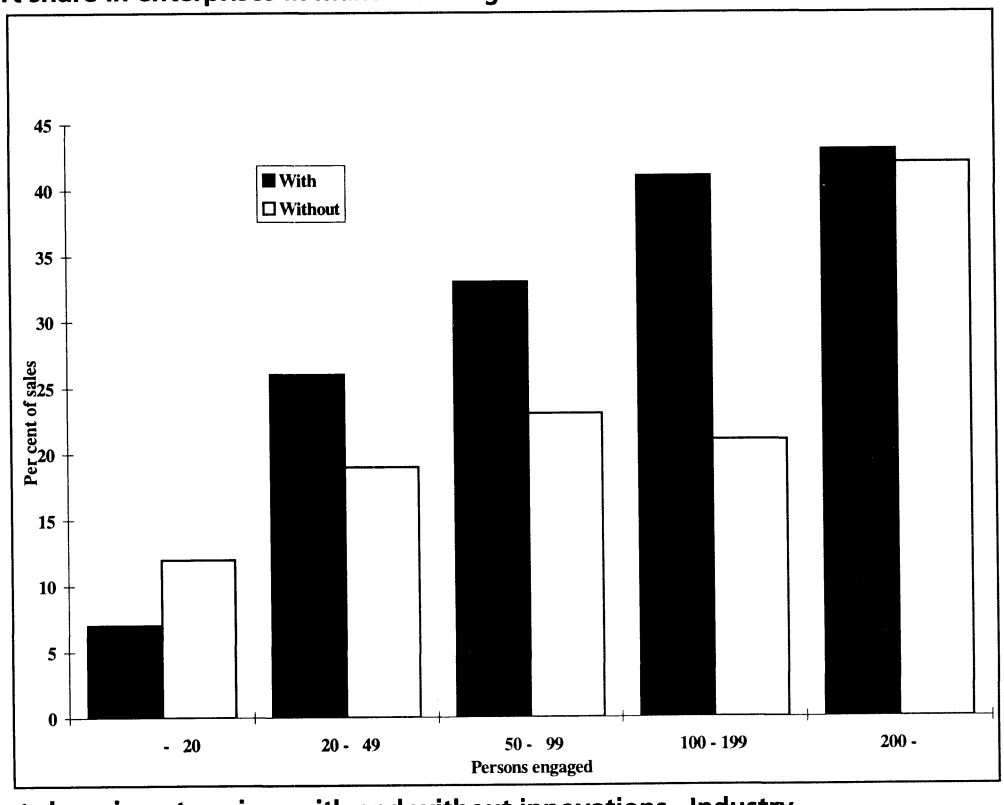


Figure 7. Export share in enterprises with and without innovations. Industry

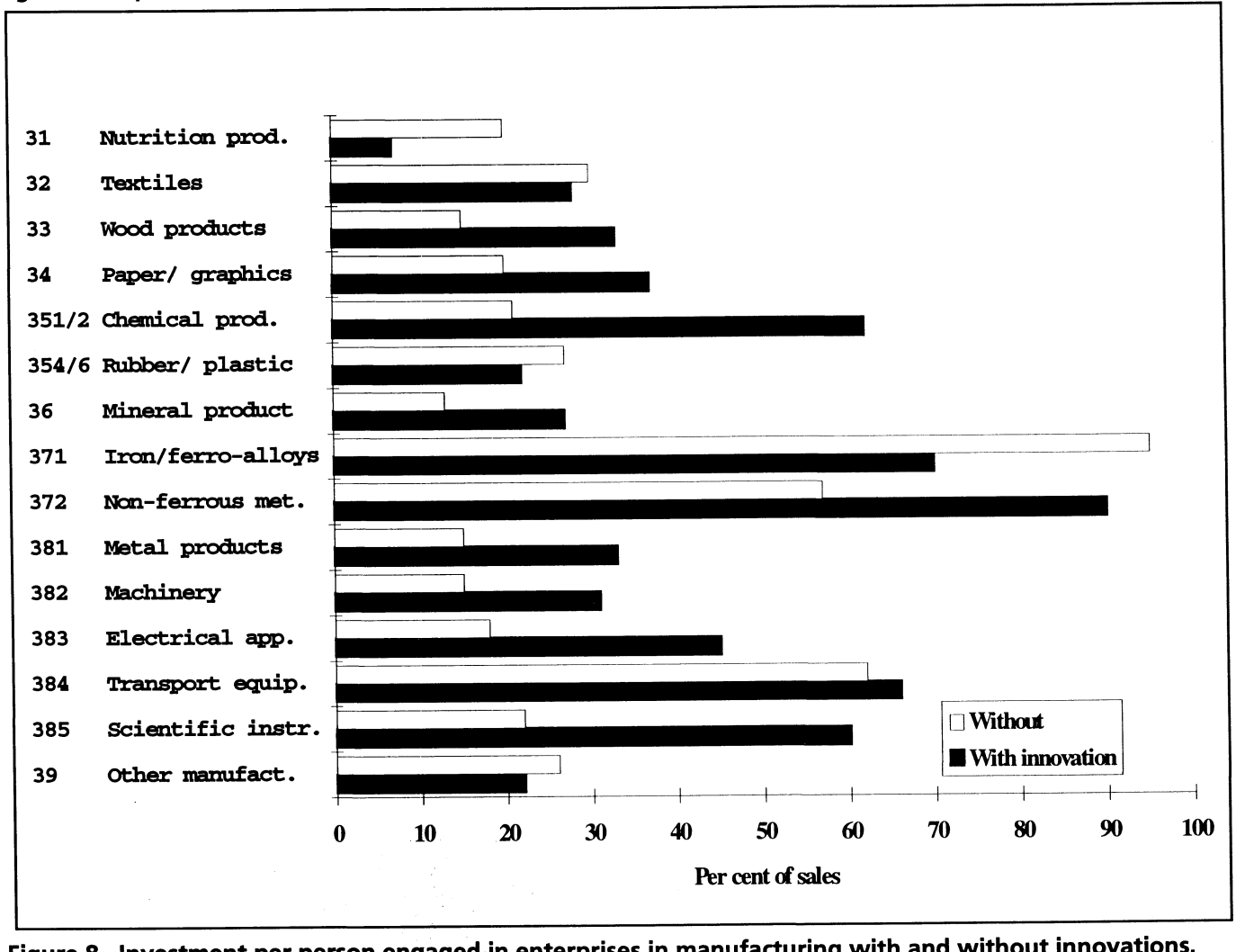


Figure 8. Investment per person engaged in enterprises in manufacturing with and without innovations.

Figure 8. Investment per person engaged in enterprises in manufacturing with and without innovations. Size class

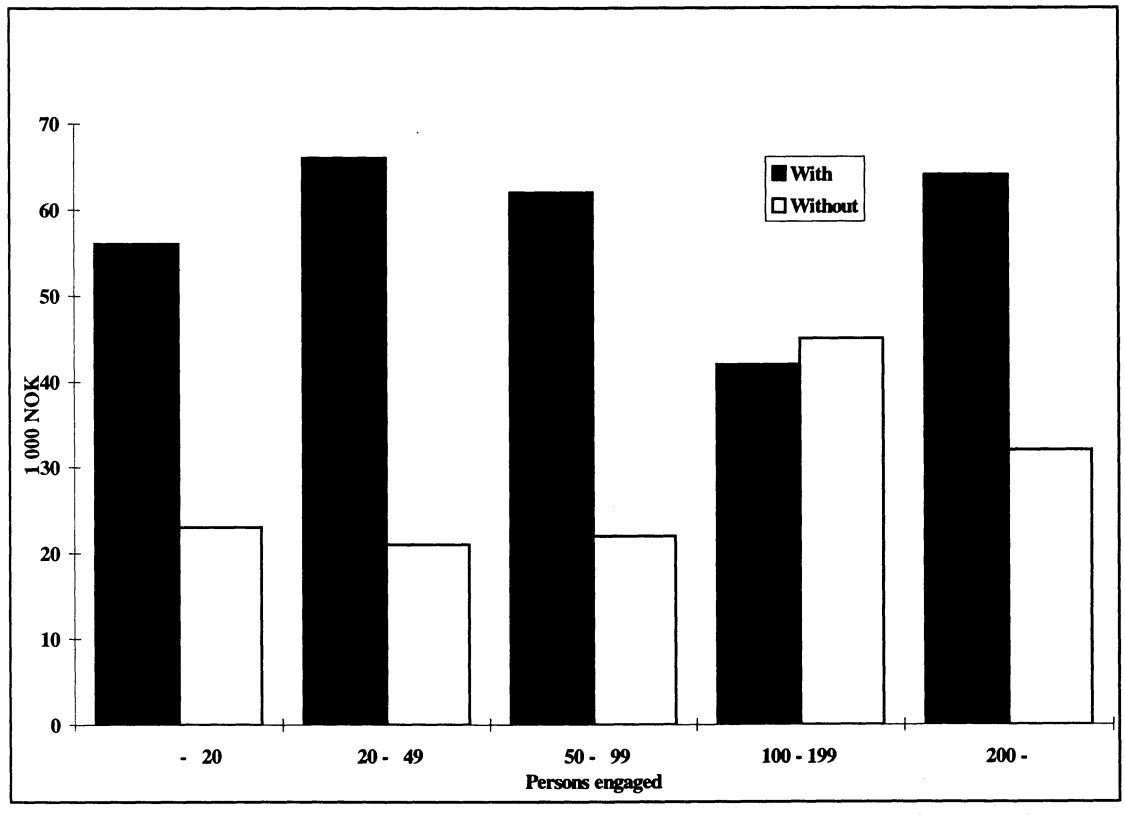
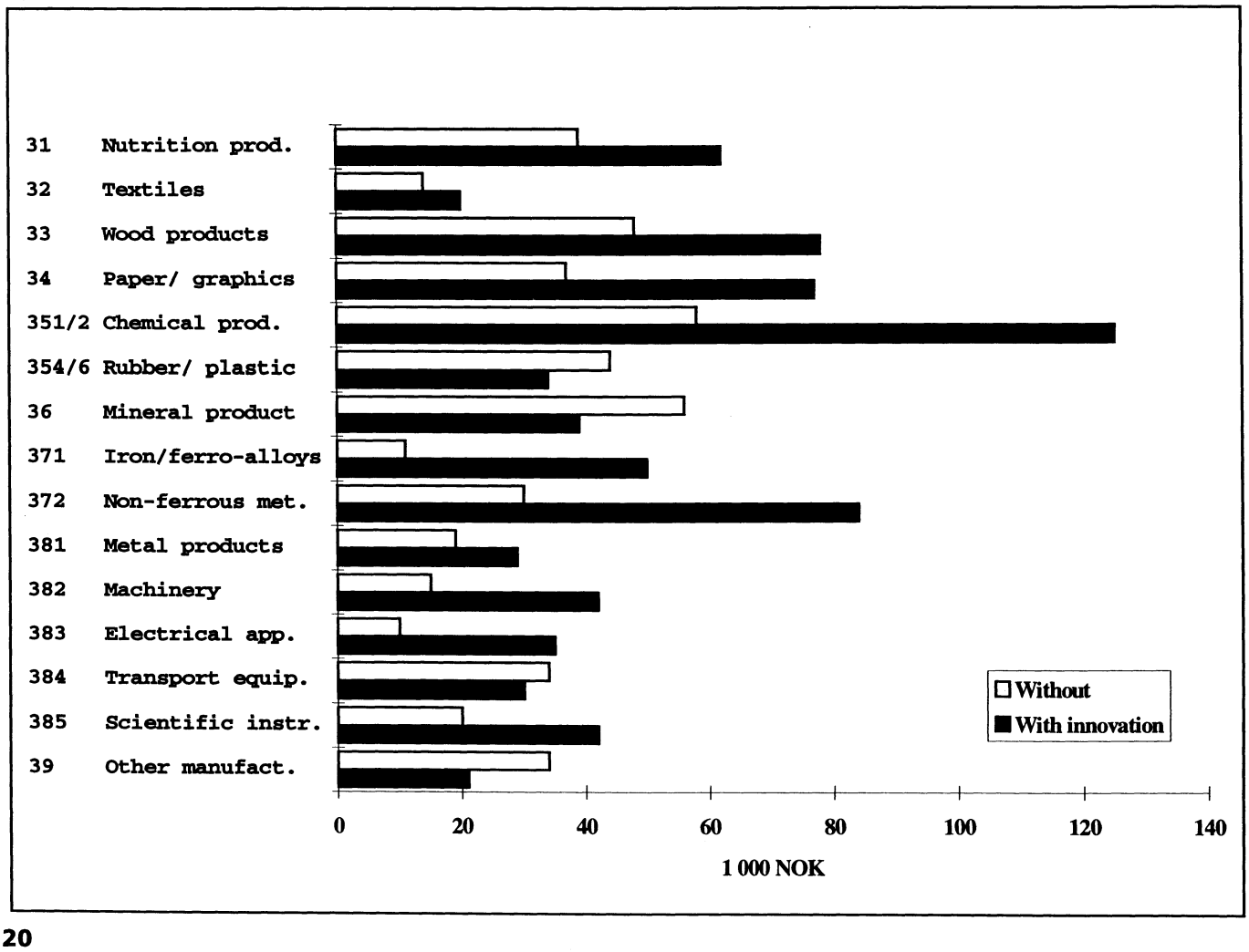
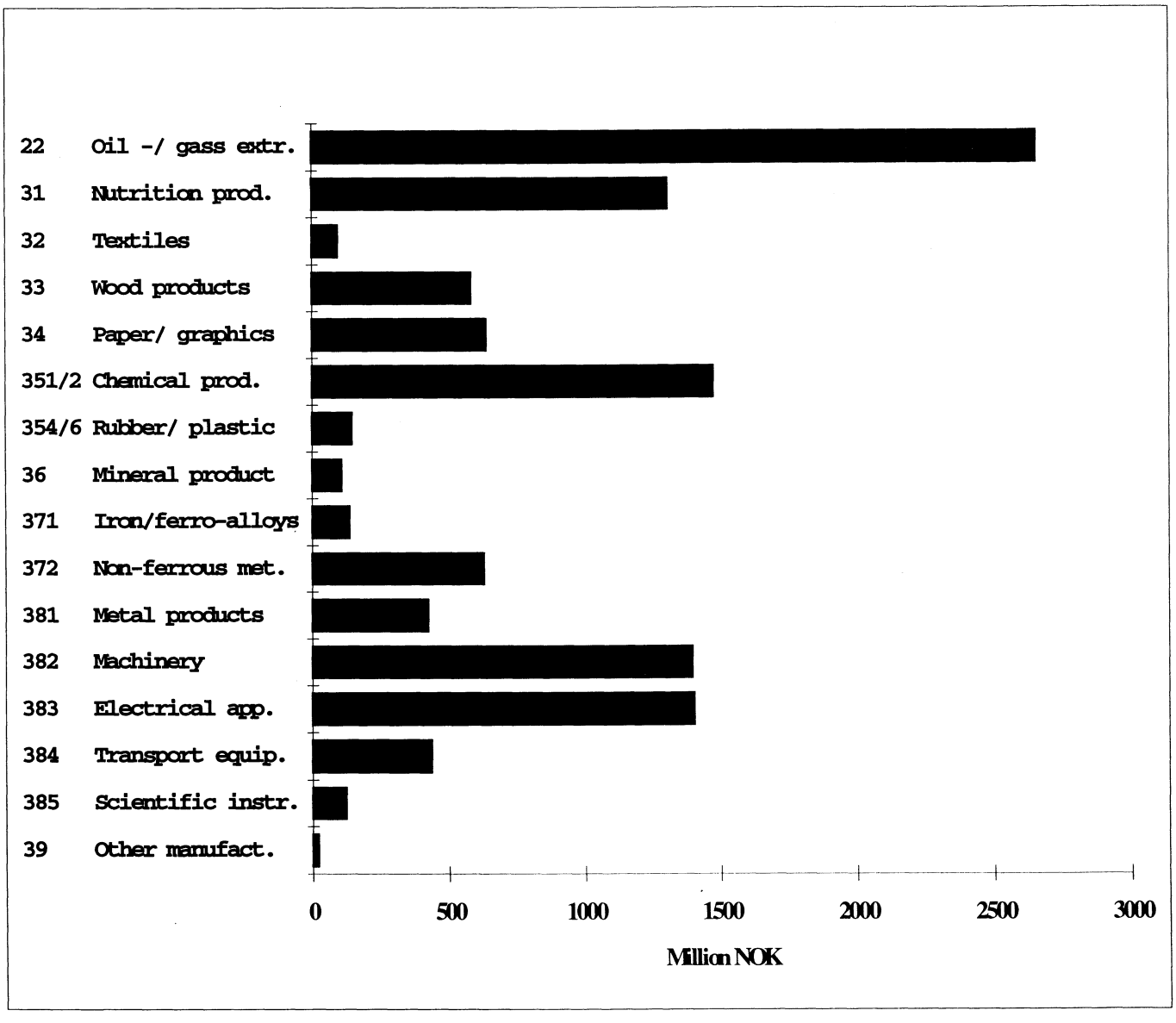


Figure 9. Investment per person engaged in enterprises with and without innovations. Industry



Creative development for NOK 11,6 billion in oil extraction and manufacturing

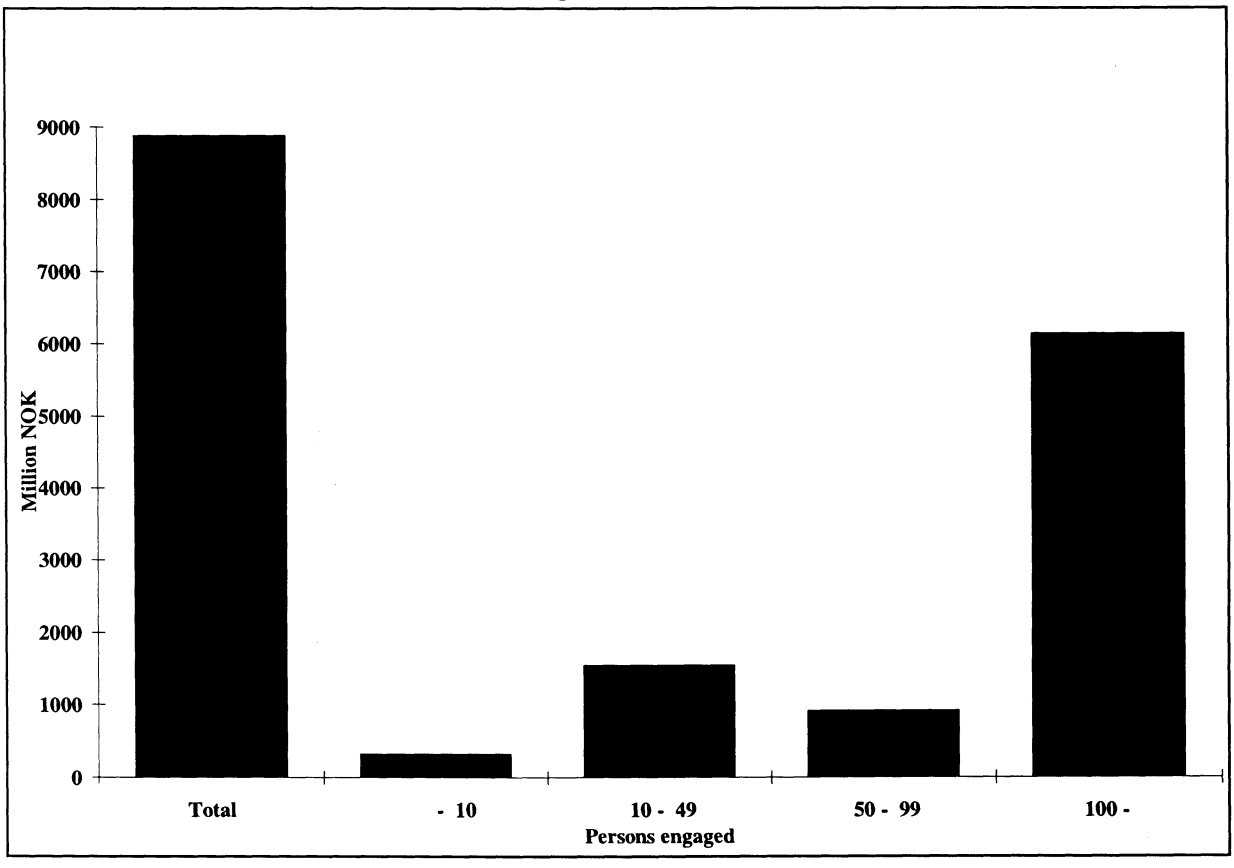
Figure 10. Total innovation costs. Industry



For enterprises participating in the survey, innovation costs in 1992 were NOK 6,6 billion. We have estimated the innovation costs for all enterprises in Norwegian manufacturing and oil extraction to about NOK 11,6 billion. The estimate is an approximate calculation in assuming that the innovative activities among the non-respondents and the residual population are the same as in the net sample.

The majority of the innovative activities were performed by the oil extraction, chemical products, electronics, machinery and nutrition industries. Oil extraction had a total of NOK 2,6 billion or 23 per cent of the total innovation costs. The chemical products industry conducted a sixth (NOK 1.471 million) of the manufacturing's innovation activities. Somewhat lower were the innovation costs in electronics and machinery industries (NOK 1.399 and 1.393 million respectively). In the nutrition industry, where only somewhat over one third were innovators, innovation costs amounted to NOK 1.183 million or slightly more than 13 per cent of the total of manufacturing.

Figure 11. Total innovation costs in manufacturing. Size class



In manufacturing the large enterprises (minimum 100 employees) invested more than two thirds (NOK 6,2 billion) of the total innovation costs. Only NOK 903 million were in the medium sized enterprises. Small enterprises (less than 50 employees) spent NOK 1.897 million. Of this the smallest enterprises with less than 10 employees, which had 15 per cent innovators, innovation costs were only NOK 314 million.

Innovation costs comprise operating and investment costs connected to the innovative activities. Operating costs on average exceeded over 2/3 of the innovation costs (see Table 4). The share of innovation costs to operations, was higher for the manufacturing enterprises with at least 200 employees than for enterprises with less than 20 employees. Of the high innovation costs in the electronics industry 90 per cent were spent on operations, and this was clearly more than other industries with considerable innovative activities.

Innovative activities exceeding NOK 3 billion purchased from external contractors

Over a quarter of the innovation activites were special services contracted outside the enterprises, from for instance consultants (see Table 4). The oil enterprises contracted 43 per cent external innovative services as compared to 16 per cent for enterprises in manufacturing. Large enterprises in manufacturing had a lower share of contracted innovative services than the smaller ones, probably because the larger ones had more capacity to perform such activities themselves.

External innovative services were not particularly extensive for the highly innovative industries apart from the non-ferrous metals manufacturing (24 per cent). The nutrition and transport equipment (384 in SC 83) industries, with a relatively low ratio of innovators, had comparatively high shares of contracted innovative services (23 and 43 per cent respectively).

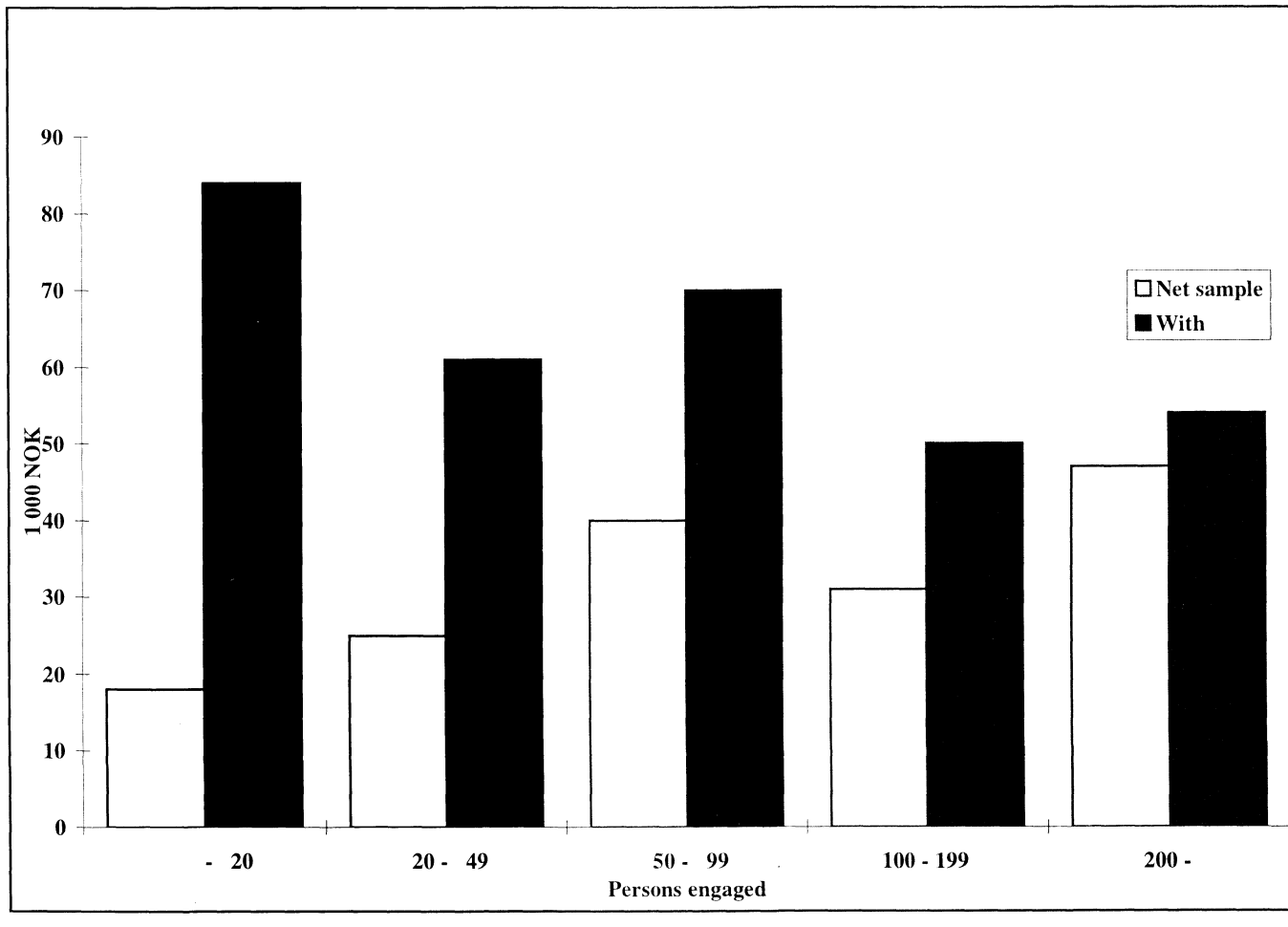
Large share of capital formations invested for innovative purposes among small innovators

Of gross fixed capital formations among the innovators in manufacturing 28 per cent was invested in connection to innovative activities (see Table 4). For the smallest enterprises with innovations this share was much higher, as much as 63 per cent, compared to only 22 per cent for the largest.

The electronics industry aimed 57 per cent of its capital formations at innovative purposes. Innovators (Figure 2) in both the wood and textiles industries invested a considerable share of their capital formations in creative development (70 and 44 per cent respectively). Besides the innovative activities in these industries consisted mainly of trial production and manufacturing start-up. It thus seems that this has mainly been process related equipment and machinery investments.

Small innovators the most intensive

Figure 12. Innovation cost per person engaged in manufacturing for the net sample and enterprises with innovations. Size class



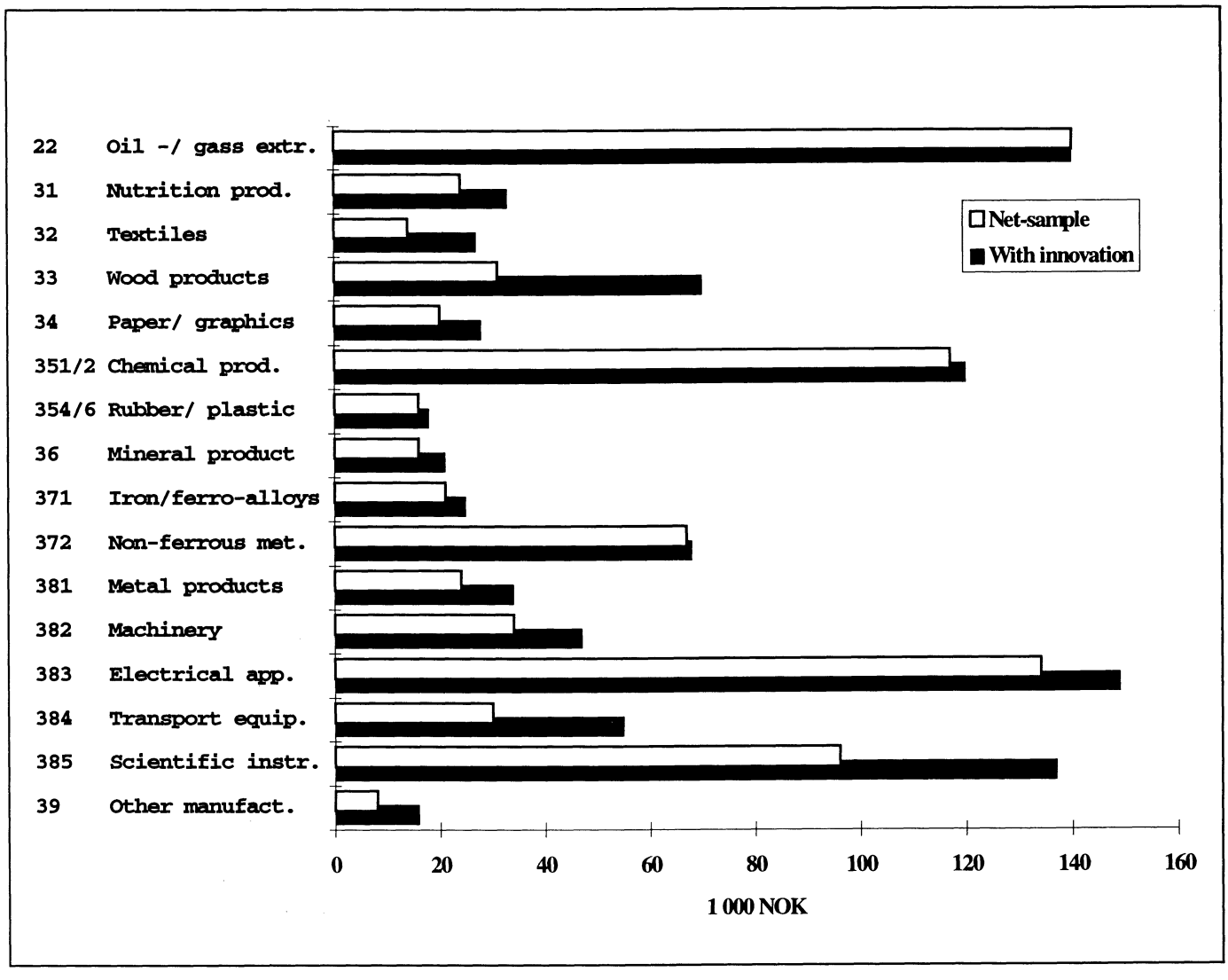
Innovation costs per person engaged is a suitable measure to compare innovative activities between different size classes and industries.

For the manufacturing enterprises in the net sample the innovation costs were NOK 41.000 per employee on average. We stress that there were significant differences between size classes, so that the largest enterprises had innovation costs of NOK 47.000 per employee as compared to NOK 18.000 among the smallest (less than 20 persons engaged). The reason for this is that only a minor part of the small enterprises declared any innovative activities.

The low share of small enterprises with innovations implies that comparisons of size classes and industries with many small enterprises are influenced by whether we look at the net sample or only at the innovators. On average the innovative enterprises in manufacturing had innovation costs of NOK 55.000 per employee. The smallest innovators had the highest innovation costs per employee, at NOK 84.000, and the largest had just over NOK 54.000 per employee.

For the entire manufacturing, the largest enterprises are the largest creative developers measured in innovation costs as a total, per employee and by share of innovators. Among the innovators solely, however, the smallest enterprises invested most intensively in innovative activities.

Figure 13. Innovation cost per person engaged in the net sample and enterprises with innovations. Industry



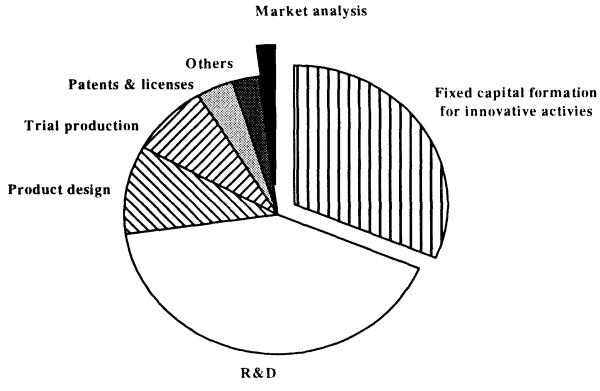
Oil extraction was highly innovative with NOK 140.000 per employee in innovation costs, as compared to NOK 41.000 in manufacturing. The electronics, chemical products and instruments (385 in SC 83) industries were also highly intensive with NOK 134.000, 117.000 and 96.000 per employee in innovation costs respectively.

The non-ferrous metals industry had innovation costs of NOK 67.000 per employee. In the wood industry, in which the share of innovators was low (Figure 2), innovative enterprises had a higher intensity than non-ferrous metals industry. A large share of the innovation costs was capital formations in this process industry.

3.2 Composition of innovative activities

The enterprises distributed costs on creative development on investment and operating costs. Operating costs were classed according to the different innovative activities such as R&D, product design, trial production and manufacturing start-up, the purchase of patents and licences and market analyses as well as the residual other costs.

Figure 14. Innovation cost in manufacturing distributed on activities as well as investment and operating costs



R&D the most important innovative activity

R&D was undoubtedly the largest innovative activity constituting 60 per cent of the operating costs. Product design and trial production were the following largest innovative activities and represented 15 and 12 per cent respectively.

Enterprises with at least 200 employees invested a larger share of the operating costs in R&D (63 per cent) and product design (15 per cent) than enterprises with less than 50 employees, which used relatively more in trial production (37 per cent), the purchase of patents and licences (10 per cent) and market analyses (6 per cent).

Figure 15. Manufacturing's costs on operating innovative activities distributed according to activities. Size class

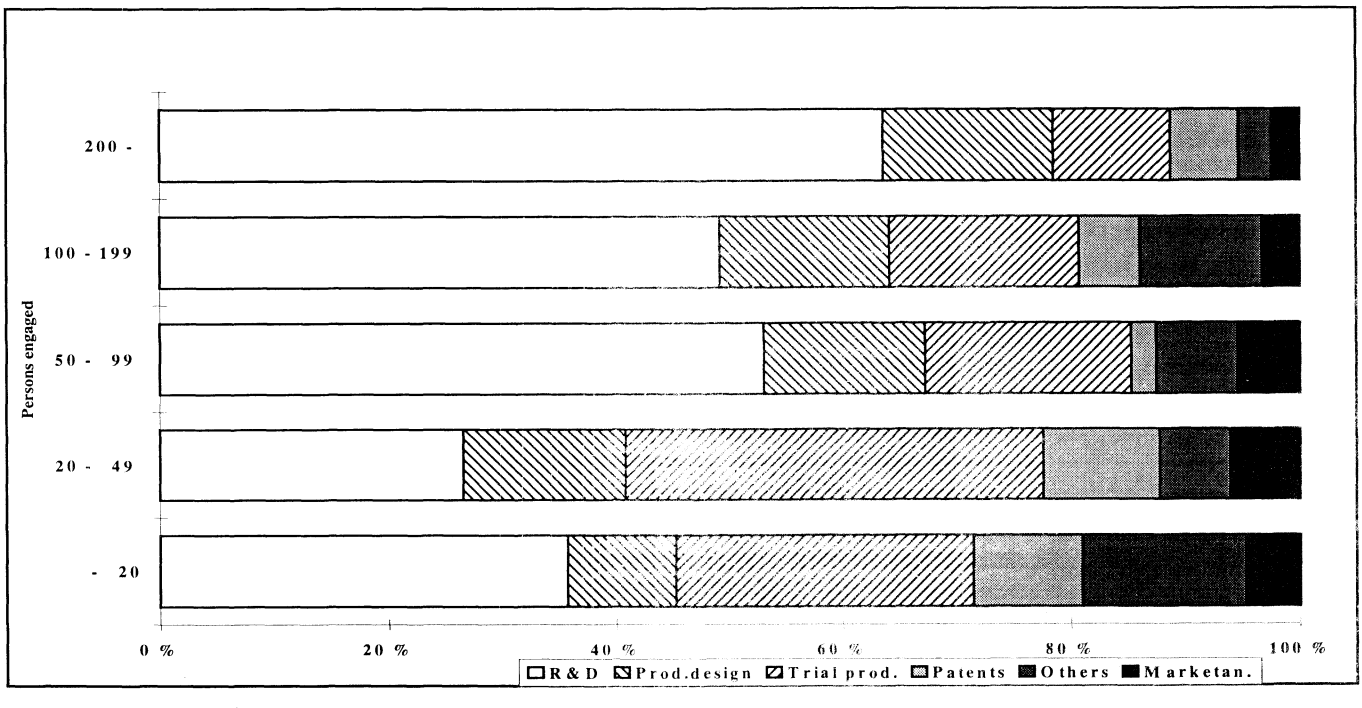
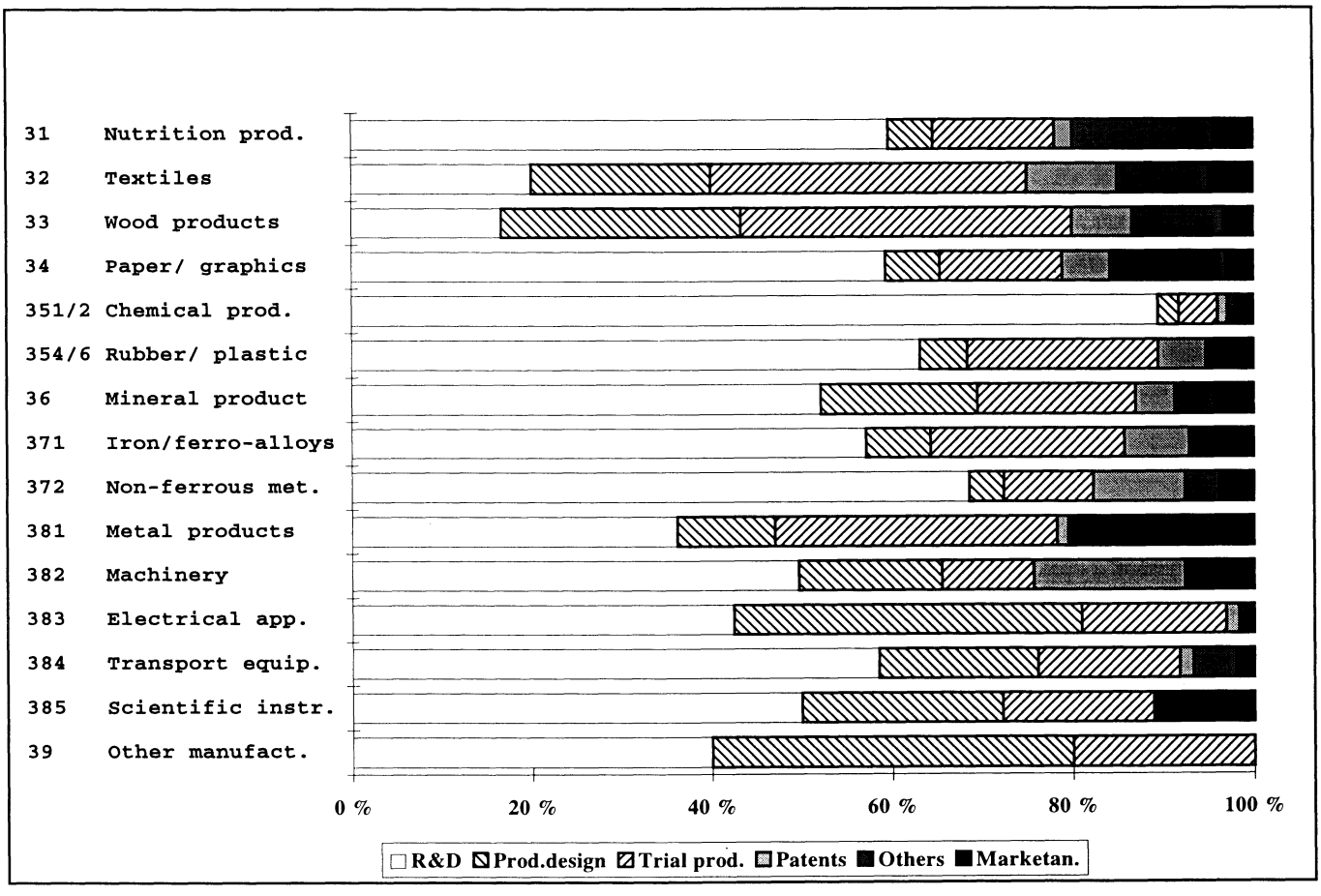


Figure 16. Manufacturing's costs on operating innovative activities distributed according to activities. Industry



Of the highly innovating industries, chemical products and oil extraction had a very high share of R&D, 89 and 78 per cent respectively.

In the electronics industry product design amounted for 38 per cent and R&D only 42 per cent. This is a typically consumer goods industry which requires to invest a large share on the practical design of the product, product design. In addition, the distinction between R&D and product design is not clear-cut, which the Oslo Manual emphasizes too. This could explain the relatively low R&D share. R&D costs per employee were still more than twice the average in manufacturing.

The tiny, but highly innovating instruments industry, which also manufactures consumer goods, distributed its operating costs likewise with a relatively high share of product design and low of R&D. The non-ferrous metals industry had a high share of R&D, but invested more than other industries in purchases of patents and licences. The machinery industry emerged as the industry with the largest share of innovation costs to purchase patents and licences.

In industries with a low share of innovators the major part of the innovation costs were spent on trial production and product design. This applied in particular to the wood and textile industries.

The highly innovating industries invested more in marketing than R&D

In the survey the enterprises were also asked to declare all marketing costs, in other words not only costs for long term market development and those associated with new and improved products. These total marketing costs were higher than the R&D costs for the innovators in manufacturing (NOK 2,4 billion or 31.000 per employee).

Exclusively analysing innovators the small enterprises which had the highest innovation costs per employee, had higher marketing costs per employee than the largest enterprises that were the least intensive innovative investors.

The market analysis constituted only 3 per cent (NOK 86 million) of the manufacturing's operating costs for the innovative activities. This is extremely small in relation to total marketing costs, which include market analysis. Compared to findings in the surveys of intangible investments where market development amounted for nearly 20 per cent, the share of market analysis appears to be low too (even though intangible investments also encompassed market development for unchanged products).

Figure 17. Marketing, R&D and innovation costs per person engaged in manufacturing. Size class

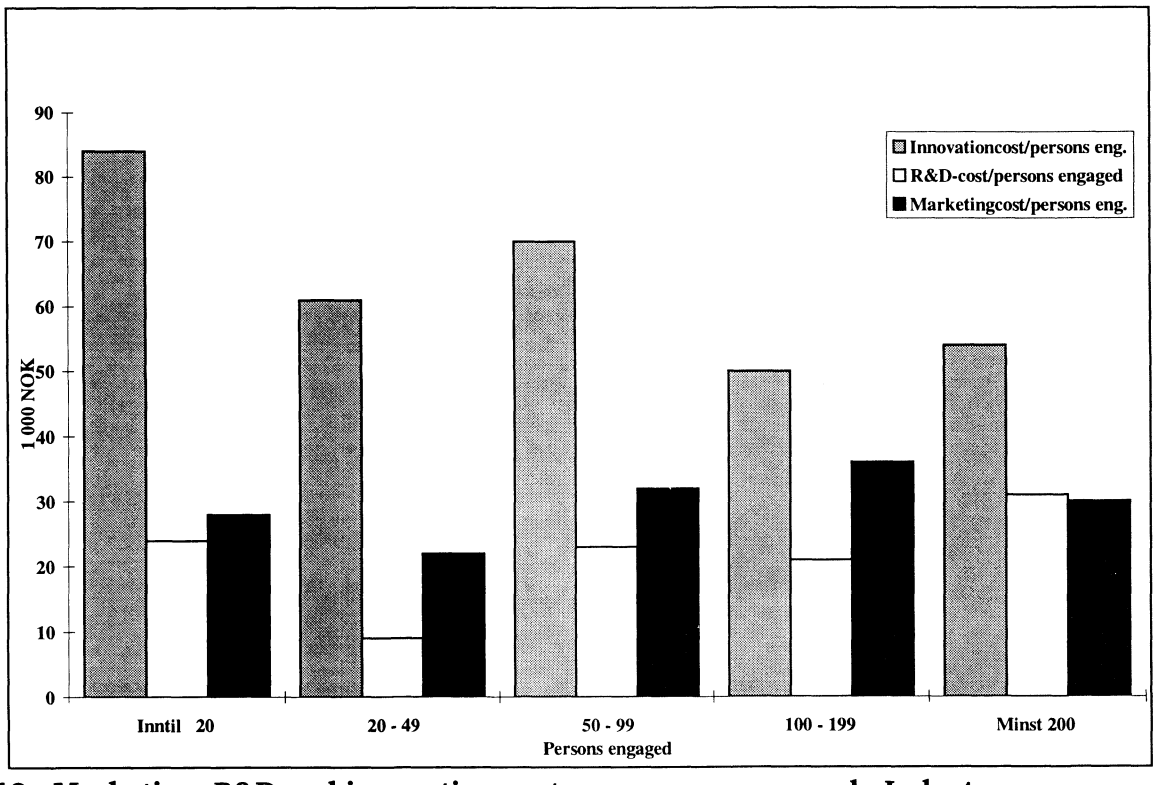
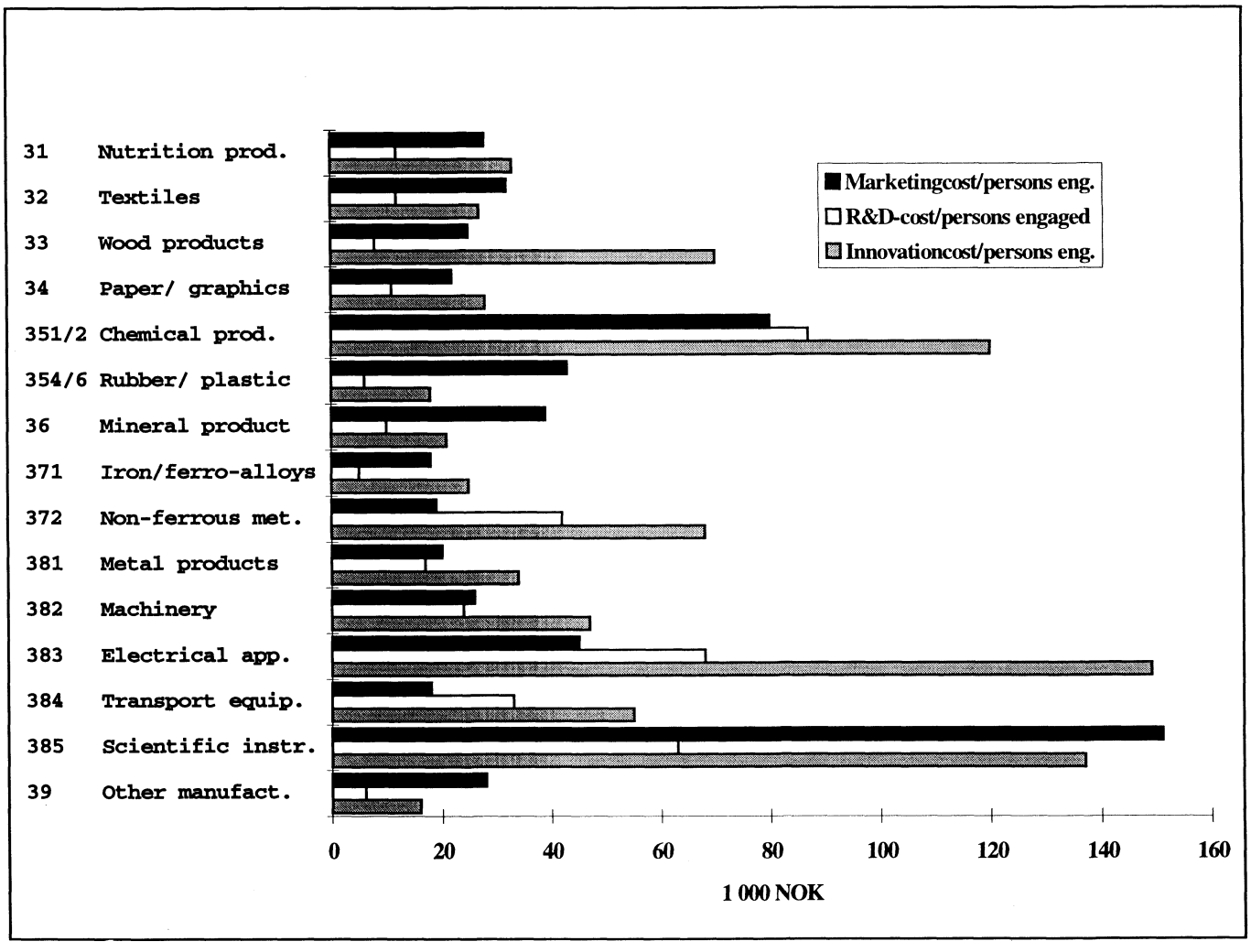


Figure 18. Marketing, R&D and innovation costs per person engaged. Industry



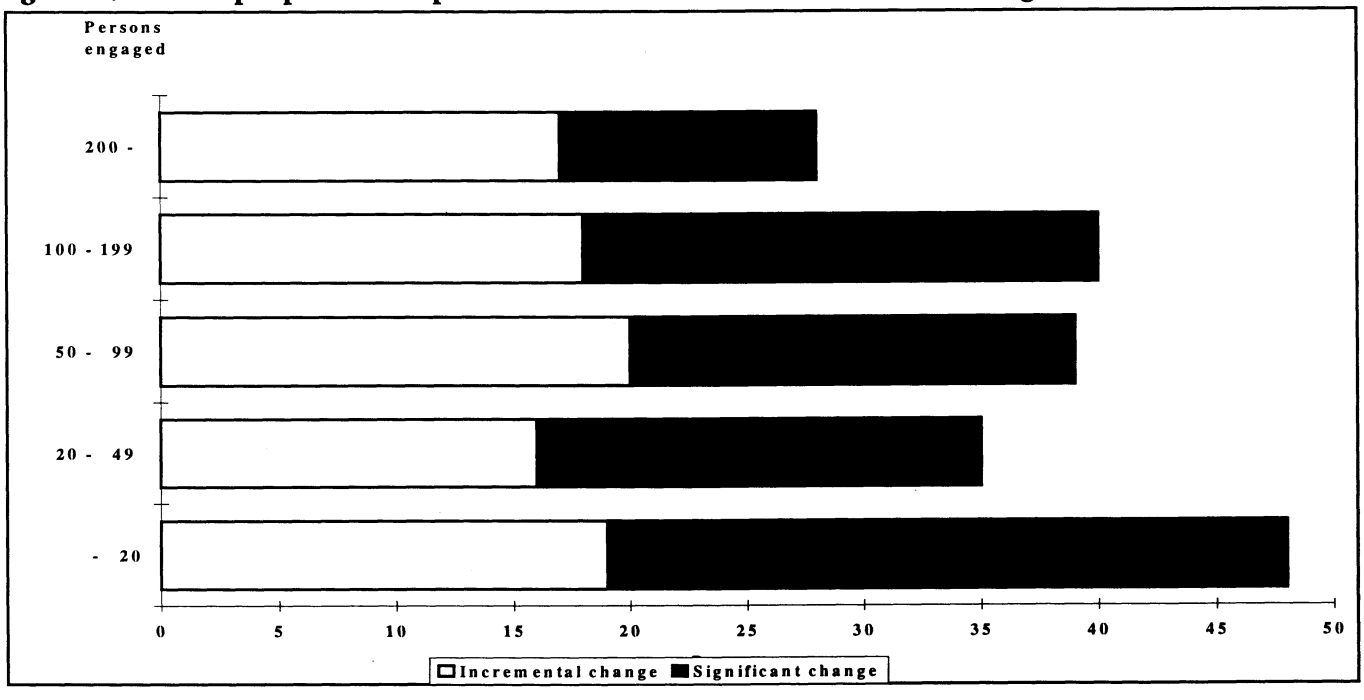
3.3 Output of innovative activities:

Sales proportion of product innovations

A measure of one result of innovative activities is the enterprise's last year's sales proportion of products which are either essentially unaltered, incrementally changed or significantly changed or new during the last three years. The method therefore only measures an outcome of the product oriented creative development, and is an indicator of product innovations. Incrementally, significantly improved or new products are in the following referred to as product innovations.

Most new products from small innovators

Figure 19. Sales proportion of product innovations. Size class. Percentage



Exclusively analysing innovators we detected that larger enterprises obtained a lower proportion of product innovations than the smaller ones. Among the largest innovators 28 per cent of turnover constituted changed products, while the corresponding figure for the smallest were 48 per cent. The smallest innovators invested the highest costs per employee on innovative activities, and achieved from these innovative inputs the largest output measured in sales proportion from product innovations.

This could be explained as a result of small enterprises mainly selling a limited product assortment and performing innovative activities on relatively many of these products. Small innovators will therefore have higher sales proportion of product innovations than large innovators which have wider product assortment.

Large enterprises usually market more product types, but have a large share of the sales concentrated around their core products. Innovative activities are mainly executed for few «small» products. For the core products with high turnover innovative activities are often aimed at the manufacturing process. Product innovations for large innovators are therefore amounting for a relatively small sales proportion.

Even if these large enterprises have relatively few product innovations with a small sales proportion, the turnover value for these is very high.

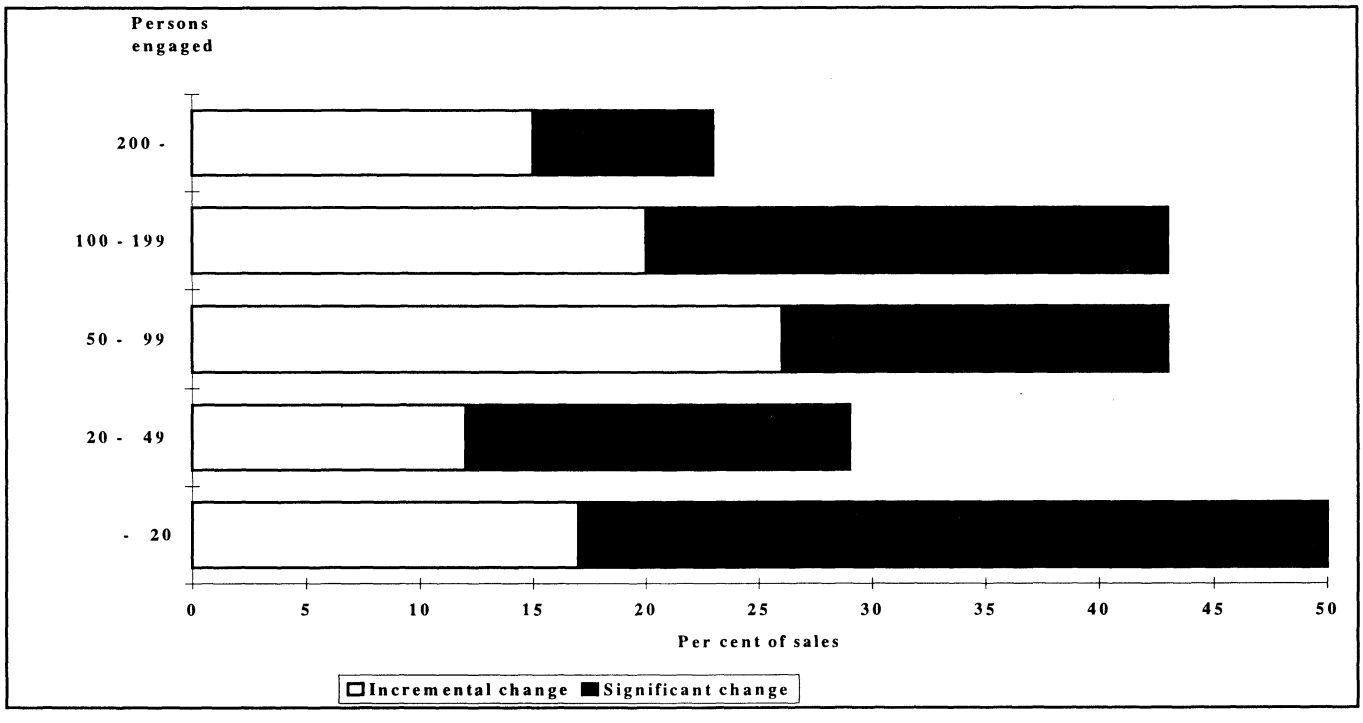
If we study both enterprises with and without innovations in manufacturing, the conclusions are reversed since there is a far larger share of the smaller enterprises reporting that they have not been introducing any new or changed products.

By including the turnover of these non-innovators and assuming that this only comprises unchanged products, we found that around 22 per cent of the sales consisted of product innovations as compared to 31 per cent for innovators in the sample for manufacturing. For the smallest enterprises around 12 per cent of the sales consisted of product innovations, while the share for the largest enterprises was 24 per cent.

Thus for manufacturing as a whole the largest enterprises invested most intensively in innovative activities, and obtained the largest outputs measured in sales proportion of product innovations, from these inputs.

More new products sold domestically rather than exported

Figure 20. Exports proportion of product innovations. Size class. Percentage



Turnover of the innovators in manufacturing amounted to NOK 1.3 million per employee of which 41 per cent was exports. Changed products constituted 31 per cent of the sales. By comparison exports consisted of only 26 per cent product innovations, and for exports intensive enterprises (at least 80 per cent exports) the proportion was 23 per cent. Domestic sales therefore had a larger share of product innovations than exports.

This was largely due to export oriented industries such as iron, steel and aluminium with large sales proportion of unchanged products. Exports of the Norwegian manufacturing consists mainly of raw materials and relatively few processed products, and these are less liable to be developed as compared to consumer goods.

Another reasonable explanation for there being less product innovations in exports, could be that the enterprises first test out new products domestically before marketing these abroad where the competition is likely to be harder.

Figure 21. Sales proportion of product innovations. Industry. Percentage

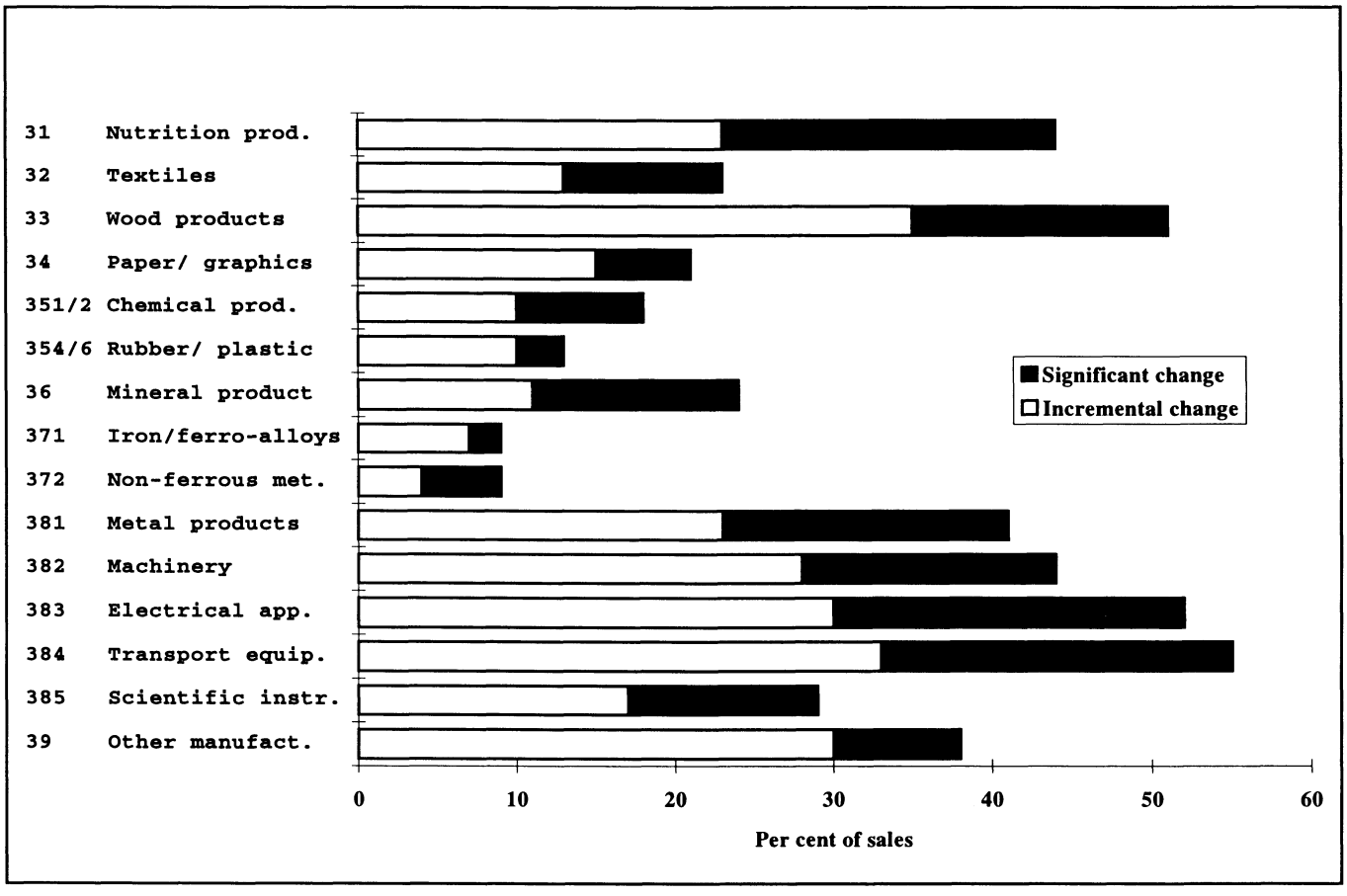
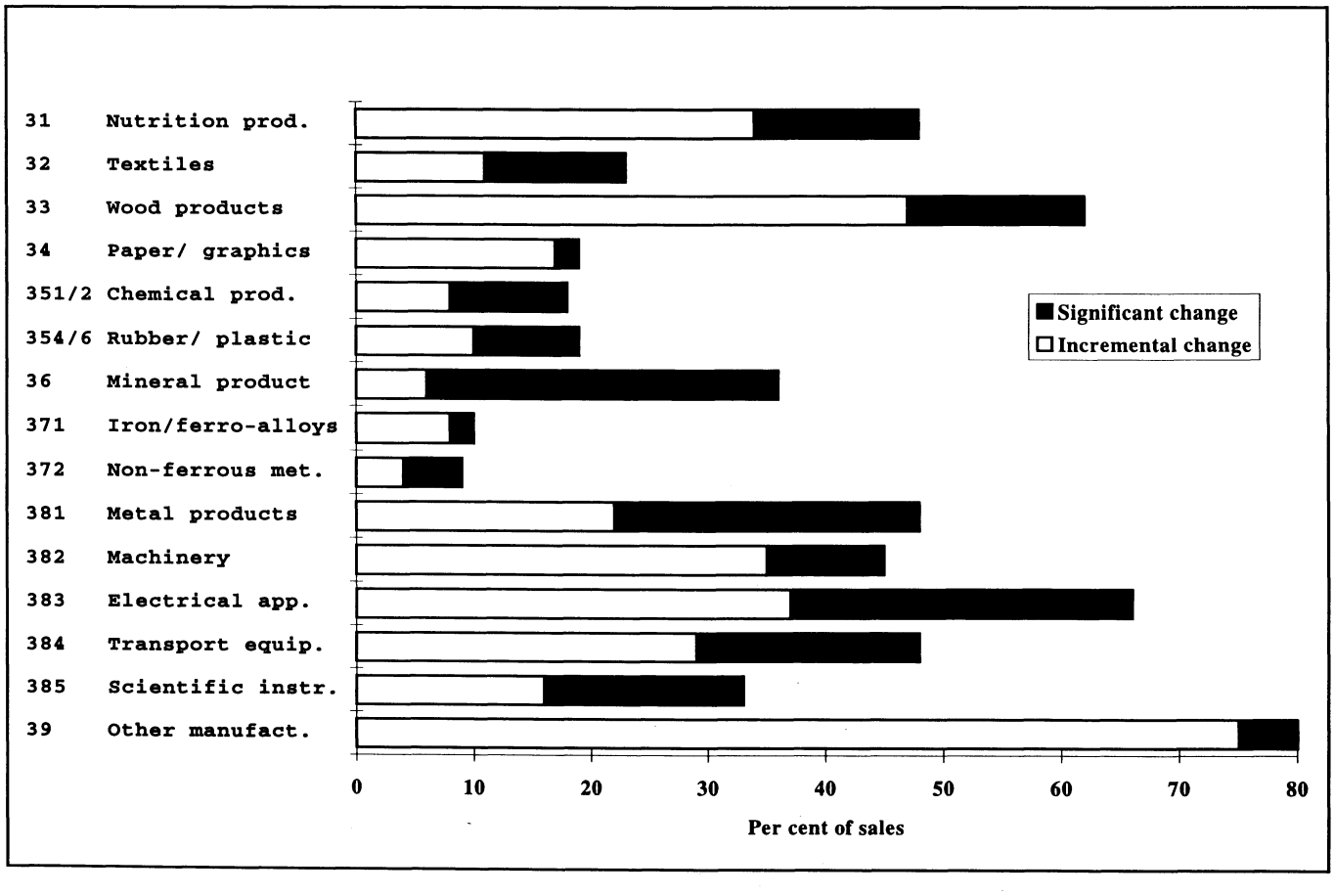


Figure 22. Exports proportion of product innovations. Industry. Percentage



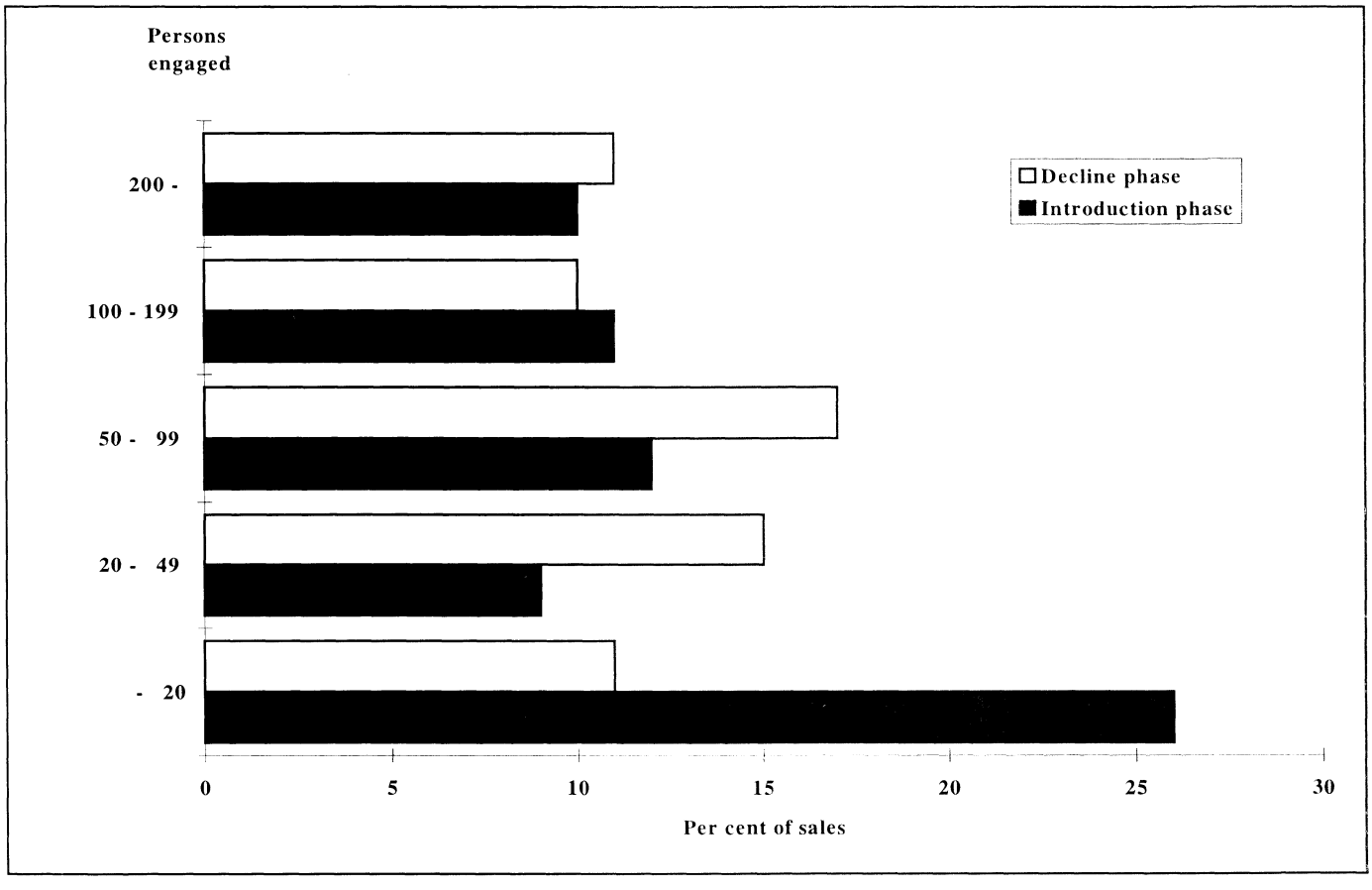
Phases of products sales life-cycle

The product's life-cycle can be described in terms of its market turnover consisting of four development phases: Introduction, growth, maturity and decline phases. The newly developed products (product innovations) are in the introduction phase, and products soon to be withdrawn from the market are in the decline phase.

Thus the sales proportion of the products in the introduction phase is an output indicator of a result of the product oriented innovative activities, or an indicator of product innovations. The ratio between the sales proportion in the introduction phase and the decline phase may therefore indicate growth potentials.

Growth potential for small innovators

Figure 23. Sales proportion by phases of products life-cycle. Size class. Percentage



The share of turnover of the products in the introduction phase was somewhat smaller than the share in the decline phase for the innovators in manufacturing. Products in the introduction phase constituted 10 per cent of sales, 22 per cent was in the growth phase, 56 per cent was in the maturity phase and 11 per cent in the decline phase. The smallest innovating enterprises reported 26 per cent of the turnover in the introduction phase compared to 10 per cent for the largest. The decline phase covered 11 per cent of the turnover for the smallest and 12 per cent for the largest enterprises with innovations. Only for the smallest innovative enterprises was the sales proportion in the introduction phase obviously larger than in the decline phase. This could isolately be interpreted as a growth potential for the smallest innovators.

However, there was a significant lower share of the small enterprises reporting to introduce new or changed products than the large ones. If we take this into consideration and assume that sales from enterprises without innovations only consisted of products in the later stages of the life-cycle, the ratio between small and large enterprises is reversed. The small enterprises get a considerably lower sales proportion in the introduction phase and the proportion becomes smaller than for the large enterprises.

3.4 The objectives of, sources for and barriers to innovative activities

Quality improvement and market shares vital aims for innovative activities

The majority (73 per cent) of the 400 enterprises with innovations considered improved product quality as a very important objective for their innovative activities (see Table 9). Somewhat fewer innovators responded that increasing or maintaining market shares or reducing production lead time as vital (72 and 65 per cent respectively). Otherwise extending range within main product field, reducing share of wage costs and cutting consumption of materials were crucial aims to relatively many innovative enterprises (50, 48 and 46 per cent respectively). It is interesting to recognize that more innovators considered extending the range within rather than outside the main product field as a vital innovative objective.

The aims were largely the same for all size classes. The largest enterprises with innovations distinguished themselves from the smaller by a relatively higher share that emphasized cost reduction and environmental improvement: Cut material consumption, improve working conditions and reduce environmental damages. For the majority of innovators with at least 40 per cent exports it was vital to create new markets in the EU. Relatively many smaller enterprises considered creating new markets in Norway and replacing products being phased out as crucial (48 and 39 per cent).

Oil extraction had distinctly different primary objectives for its vast innovative activities than manufacturing. In oil extraction it was of major importance to improve working conditions, reduce environmental damages and cut energy consumption (for 80, 80 and 70 per cent of the enterprises respectively). In the chemical products industry 67 per cent of the enterprises ranked new EU markets as an aim of large and decisive importance. Product development and improvements were, however, evaluated as vital to most innovative activities by the enterprises.

All innovators in the non-ferrous metals industry responded that improving working conditions were crucial to their extensive innovative activities. Otherwise this industry was primarly concerned of reducing costs: Wage, material and energy consumption (89, 78 and 67 per cent respectively).

In the electronics industry 59 per cent reported that to replace out-phased products was a vital innovative aim, but the majority gave priority to market shares, improving product quality and extending the main product range.

Industries with a low share of innovators and low innovation costs per employee, particularly nutrition and textiles industries, responded that reducing costs and in particular wages were a vital innovative aim. Many enterprises in the nutrition industry emphasized process oriented objectives such as improving working conditions and reducing production lead-time too.

Customer contact vital to the innovative process

The most important source of innovative ideas for the majority of the innovators were customers (see Table 13). Numerous innovators also considered internal sources in the enterprise as crucial. For a relatively large number of enterprises with innovations, the contractors of equipment and components were the most important source of innovative ideas.

Many innovators responded that patents documents and consultants were of minor importance as innovative source. This is astonishing in the view that patents being a frequently used indicator of innovative activities, and that almost a fifth of R&D costs and 16 per cent of operating costs of innovative activities were costs for innovative services contracted externally. A large share of these costs was for innovative services purchased from consultants. There was a bigger share of the largest innovative enterprises who responded that consultants were a very important source of innovative ideas.

Among the largest enterprises, relatively many considered commercial conferences and literature as a vital source of idea for their innovative activities. A high share of the enterprises with less than 50 employees evaluated universities and governmental research institutes as a source of minor importance for their innovative activities.

As regards sources for innovative ideas there were small industrial differences, and to all industries except some traditional high technology industries, universities and governmental research institutes were of minor importance. For the majority of the enterprises in oil extraction, however, universities were a vital source for innovative ideas. A crucial innovative source to many enterprises in the electronics industry were commercial conferences and literature. A relatively large share of the enterprises in the metal products industry responded that competitors were a very important source for their innovative ideas. In the nutrition industry the largest share of innovators reported contractors of equipment as the vital source. In the chemical products and wood-processing industries, a large share of the enterprises stated commercial conferences and litterature as the most important sources of innovative ideas.

High costs and excessive perceived risks hamper innovative activities

We studied factors hampering innovative activities both for enterprises with and without innovations. Economic factors, such as high costs and excessive perceived risks in addition to enterprise related factors such as lack of innovative capacity and skilled personnel, hampered innovative

activities crucially both for the majority of the innovators and the non-innovators (see Table 17).

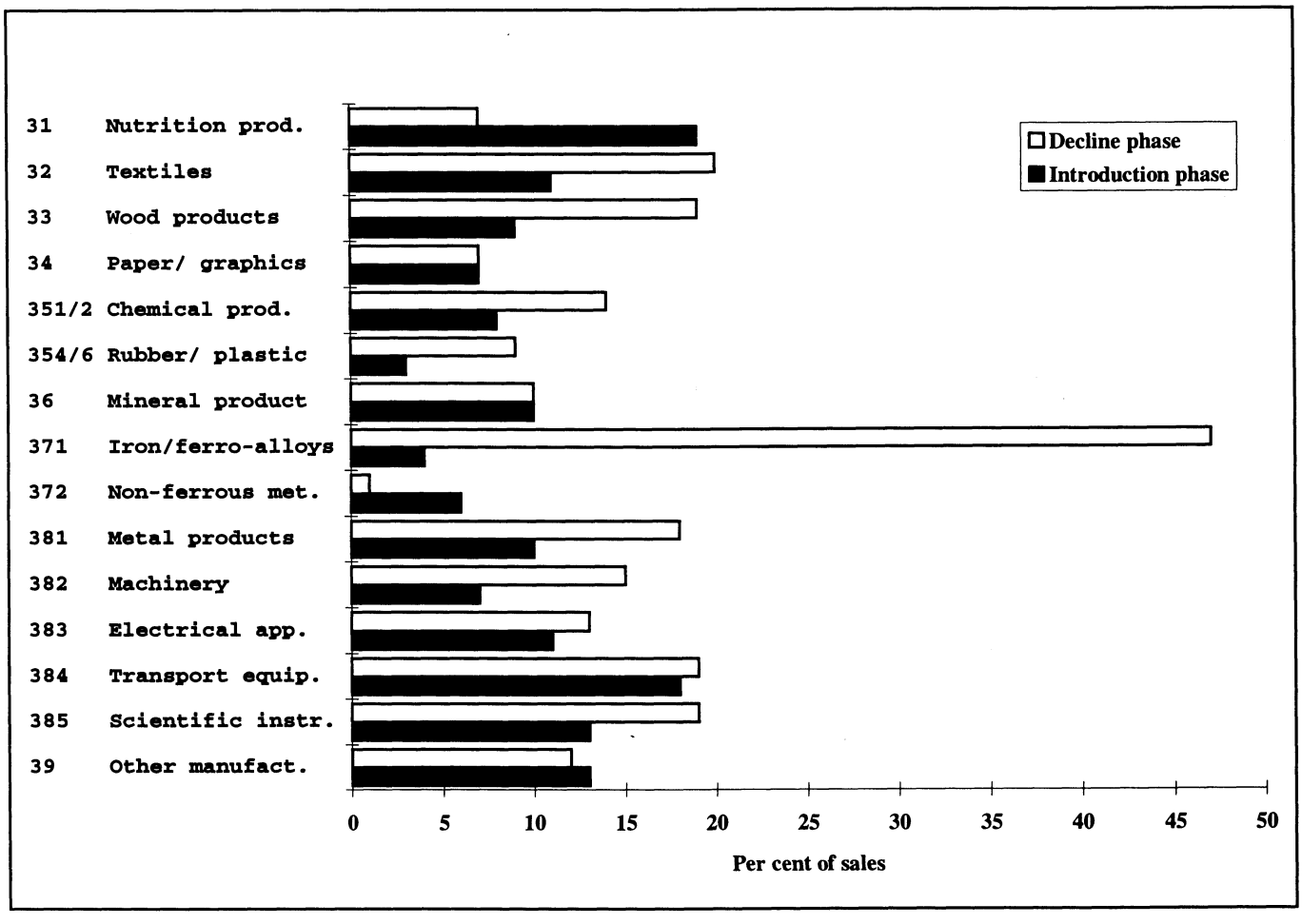
The differences according to size and industry were small, but a large share of the enterprises in oil extraction expressed that a very important factor hampering innovative activities was customers unresponsiveness to innovations.

A large share of innovative enterprises in the chemical products industry responded that lack of technological opportunities formed the largest innovative barrier.

There was a higher proportion of innovators than non-innovators that expressed that economic rather than enterprise factors hampered innovative activities. The majority of enterprises without innovations in the chemical products industry responded that former innovations had made new ones superfluous. A large share of non-innovators in the non-ferrous metals industry reported that lack of market information and technological opportunities obstructed innovative activities most. The majority of the non-innovators with at least 80 per cent exports expressed that lack of sources of finance was the most important factor hampering innovative activities.

3.5 The electronics industry most innovative

Figure 24. Sales proportion by phases of products life-cycle. Industry. Percentage



The innovators in the electronics industry obtained the largest output from their innovative activities measured in product innovations' sales proportion. In consideration of this, however, it is reasonable to remember that to gain this they invested most intensively in innovative inputs measured by innovation costs per employee.

The innovative activities in the electronics industry were very extensive. This creative development was performed by a high share of innovative enterprises (Figure 2) which spent almost one sixth of the innovation costs for the manufacturing industries (Figure 10). These innovators in the electronics industry had the highest innovation costs per employee at NOK 149.000 (Figure 13), compared to the average of NOK 55.000 of the innovators in manufacturing. These innovation costs amounted to 14 per cent of sales. As much as 57 per cent of gross fixed capital formations, which were only NOK 35.000 per employee, was invested for innovative purposes.

Product design constituted 38 per cent (Figure 16) of the creative development in the electronics industry. R&D was only 42 per cent, but R&D costs per employee was still more than double the average. As much as 78 per cent of this R&D was product related (Table 5). Marketing costs amounted as much as NOK 45.000 per employee (Figure 18). The long term market analysis, however, was extremely low with only 1 per cent of the innovation costs.

Increasing or maintaining market shares, extending the main product range and improving product quality were the vital objectives for the innovative activities in the electronics industry (Table 9). A growth strategy based upon extending the range outside the main product field, was crucial to only few enterprises.

The innovative electronics industry had more than NOK 1 million per employee in turnover (Figure 5) and 52 per cent of this consisted of changed products (Figure 21). Only 11 per cent of these sales, however, was related to products in the introduction phase and 13 per cent in the decline phase (Figure 24), which regarding this exclusively could indicate a weak growth potential. The extensive investments in product design and improvement as well as marketing measures, thus resulted in much product innovations.

The innovators in the chemical products industry were large with 380 persons engaged per enterprise (Figure 3) and gross fixed capital formations of NOK 124.000 per employee (Figure 9) as compared to the average in manufacturing of 198 persons engaged per enterprise and NOK 60.000 in capital formations per employee.

There were extensive innovative activities in the chemical products industry as well, with a considerable share of enterprises with innovations (Figure 2), which reported 1/6 of the innovation costs in manufacturing or as much as NOK 120.000 per employee (Figure 18). It was the most R&D intensive industry with NOK 87.000 per employee (Figure 18) as compared to NOK 29.000 for the average in manufacturing. Product development comprised 67 per cent of R&D as compared to 57 per cent for the innovators in manufacturing (Table 5). Marketing costs of NOK 80.000 per employee were almost as high as the R&D costs (Figure 18), and this was the second highest of all industries. The long term market analysis constituted only 2 per cent of the innovation costs (Figure 16).

The vital objectives of innovative activities in the chemical products industry were the same as for the electronics industry, increasing market shares, improving product quality and extending main product field (Table 9). Extending the product range outside the main field as a growth strategy, was very important to only a minority of the enterprises.

Product innovations constituted only 19 per cent of sales (Figure 21) of chemical products innovators, which was low compared to 31 per cent for the innovative enterprises in manufacturing as a whole. Only 8 per cent of this turnover comprised products in the introduction phase and 14 per cent were in the decline phase (Figure 24). Almost half of the sales comprised products in the maturity phase. On average these innovators were "twice" as large measured in turnover and very export intensive, with a turnover exceeding NOK 2 million per employee (Figure 5), and 64 per cent of this was exported (Figure 7).

These capital intensive, export oriented large chemical products enterprises with a high share of turnover in the maturity phase, had very extensive product oriented innovative activities and marketing measures. The output of these investments were low measured by the sales proportion of product innovations. Their turnover was, however, double the average of all the innovators in manufacturing, which implies that the absolute sales values of product innovations were extremely high.

Another industry with relatively high investments in innovative activities and scarce results measured in product innovations' sales proportion was the non-ferrous metals industry. On average the industry's enterprises with innovations were very large and capital intensive, with almost 1.000 persons engaged per enterprise (Figure 3) and capital formations of NOK 84.000 per employee (Figure 9). This industry was, relatively speaking, highly innovating with NOK 68.000 per employee in innovation costs (Figure 18). R&D measures were relatively extensive with NOK 42.000 per employee (Figure 18), but only 3 per cent of this was product related (Table 5).

The innovators in non-ferrous metals industry were extremely export oriented with 90 per cent exports (Figure 7) of the huge turnover of NOK 1,6 million per employee (Figure 5). Only 9 per cent of this sales consisted of changed products (Figure 21). The low share of product innovations was probably due to the fact that this is a typically export oriented process industry which manufactures raw materials and semi-finished products, and the innovative activities were therefore process related.

For other industries the picture was even more varied. The share of enterprises with innovations in the wood industry was very low (Figure 2), but they had 51 per cent product innovations (Figure 21). In the metals industry 91 per cent of the innovators' turnover consisted of unchanged products. Almost as low product innovations' sales proportions were reported among innovative enterprises within wood-processing and rubber and plastic products industries.

For the relatively few enterprises with innovations in the nutrition industry (Figure 2) 19 per cent of their sales comprised products in the introduction phase and 7 per cent in the decline phase (Figure 24), and thus indicated a growth potential for them. The relatively few innovators in the transport equipments industry reported 18 per cent of turnover in the introduction phase and approx. the same proportion in the decline phase. In the rubber and plastic products industry only 3 per cent of the turnover of innovative enterprises was in the introduction phase and 9 per cent in the growth phase. A total of 79 per cent of this industry's sales was in the maturity phase and 9 per cent in the decline phase.

Table 1. Population, non-response, gross and net sample for the innovation survey. 1992

Industry major group/ Employment group	Population: Enterprises	Population: Persons engaged	Gross sample: N	Gross sample: t	Gross sample: d	Non-response: N	Non-response: s	Non-response: d	Net sample, With innovations: N	Net sample, With innovations: s	Net sample, With innovations: d	Net sample, Without innovations: N	Net sample, Without innovations: s	Net sample, Without innovations: d
2,3 OIL EXTR., MINING AND MANUFACTURING	5 606	297 288	1 902	34	78	917	48	30	400	21	38	586	31	10
- 10 employees	1 989	13 300	388	20	20	191	49	10	32	8	2	166	43	9
10 - 19 "	1 468	19 706	412	28	28	202	49	14	52	13	4	158	38	11
20 - 49 "	1 171	35 924	364	31	31	174	48	15	67	18	6	123	34	10
50 - 79 "	360	22 434	191	53	53	98	51	27	44	23	13	49	26	13
80 - 99 "	131	11 498	60	46	46	28	47	21	19	32	15	13	22	10
100 - 149 "	171	20 782	171	100	100	82	48	48	53	31	31	36	21	21
150 - 199 "	74	12 681	74	100	100	36	49	49	24	32	32	14	19	19
200 - "	242	160 963	242	100	100	106	44	34	109	45	59	27	11	7
2 OIL EXTRACTION, MINING AND QUARRYING	141	30 645	54	38	96	22	41	10	15	28	83	17	31	3
21 Coal mining	1	391	1	100	100	1	100	100	.	.	.	.	.	.
22 Crude petroleum/ natural gas prod.	16	25 986	14	88	100	4	29	6	10	71	94	.	.	.
23 Metal ore mining	7	1 803	6	86	98	3	50	25	2	33	53	1	17	20
29 Other mining	117	2 465	33	28	55	14	42	25	3	9	13	16	48	18
3 MANUFACTURING	5 465	266 643	1 848	34	76	895	48	32	385	21	33	569	31	11
- 20 employees	3 370	32 255	783	23	25	385	49	12	83	11	3	316	40	10
20 - 49 "	1 146	35 191	353	31	31	170	48	15	66	19	6	117	33	10
50 - 99 "	483	33 428	246	51	50	123	50	25	62	25	13	61	25	12
100 - 199 "	241	32 864	241	100	100	116	48	48	76	32	32	49	20	20
200 - "	225	132 905	225	100	100	101	45	39	98	44	52	26	12	9
31 Food, beverages and tobacco	1 104	50 336	372	34	74	190	51	38	67	18	26	116	31	10
- 50 employees	927	14 332	239	26	29	118	49	14	29	12	5	93	39	10
50 - 149 "	121	9 953	77	64	69	43	56	39	18	23	16	16	21	14
150 - "	56	26 051	56	100	100	29	52	50	20	36	42	7	13	8
311/2 Food	1 071	44 543	352	33	71	182	52	38	62	18	25	109	31	8
313/4 Beverages and tobacco	33	5 793	20	61	95	8	40	36	5	25	36	7	35	23
32 Textiles, wearing apparel, leather	279	8 114	91	33	51	42	46	24	15	16	14	34	37	14
321 Textiles	167	5 201	57	34	58	27	47	25	9	16	18	21	37	15
322 Wearing apparel, ex. footwear	81	2 052	24	30	38	11	46	22	3	13	3	10	42	13
323 Leather, except wearing apparel ..	18	462	6	33	51	1	17	4	3	50	31	2	33	16
324 Footwear	13	399	4	31	33	3	75	32	.	.	.	1	25	1
33 Wood	760	20 250	224	29	55	121	54	30	29	13	11	74	33	14
331 Wood products, except furniture ..	521	13 675	152	29	55	82	54	32	17	11	8	53	35	15
332 Furniture and fixtures	239	6 575	72	30	54	39	54	25	12	17	16	21	29	12
34 Paper, printing and publishing ...	872	44 157	285	33	80	137	48	27	58	20	38	90	32	15
341 Paper	62	11 882	38	61	95	17	45	35	13	34	50	8	21	9
342 Printing, publishing, allied ind.	810	32 275	247	30	74	120	49	24	45	18	33	82	33	17

N is the number of enterprises
t is the sample fraction
s is the response rate; the number of enterprises in the net sample in per cent of the gross sample
d is the coverage rate; the number of persons engaged in the sample in per cent of the population

Table 1(cont.). Population, non-response, gross and net sample for the innovation survey. 1992

Industry major group/ Employment group		Population Enterprises	Population Persons engaged	Gross sample N	Gross sample t	Gross sample d	Non-response N	Non-response s	Non-response d	Net sample With innovations N	Net sample With innovations s	Net sample With innovations d	Net sample Without innovations N	Net sample Without innovations s	Net sample Without innovations d
35	Chemicals, rubber, plastic prod. .	285	24 192	108	38	85	64	59	32	29	27	50	15	14	2
351	Industrial chemicals.....	28	9 906	16	57	95	5	31	21	11	69	75	.	.	.
352	Other chemical products	66	6 424	27	41	84	17	63	35	7	26	46	3	11	4
354	Products of petroleum and coal ...	7	1 779	4	57	99	3	75	49	1	25	50	.	.	.
355	Manufact./ repair of rubber prod.	23	690	8	35	73	5	63	28	1	13	42	2	25	3
356	Plastic products	161	5 393	53	33	64	34	64	45	9	17	13	10	19	6
36	Mineral products	216	8 281	73	34	73	31	42	34	16	22	29	26	36	10
361	Ceramics	7	813	4	57	97	1	25	20	3	75	77	.	.	.
362	Glass and glass prod.	28	1 733	13	46	81	6	46	20	4	31	37	3	23	23
369	Other mineral products	181	5 735	56	31	67	24	43	40	9	16	19	23	41	8
37	Basic metals	66	18 898	45	68	97	18	40	26	17	38	68	10	22	4
371	Iron, steel and ferroalloys	36	7 496	28	78	96	14	50	54	8	29	35	6	21	8
372	Non-ferrous metals	30	11 402	17	57	98	4	24	7	9	53	89	4	24	1
38	Fabr. machinery and equipment	1 779	88 788	616	35	75	277	45	33	147	24	30	192	31	12
	- 50 employees	1 444	22 537	366	25	28	168	46	12	55	15	5	143	39	11
	50 - 149 "	233	19 255	148	64	69	63	43	29	51	34	25	34	23	15
	150 - "	102	46 996	102	100	100	46	45	44	41	40	44	15	15	12
381	Metal products	713	19 092	214	30	53	93	43	21	43	20	21	78	36	10
382	Machinery	412	36 527	156	38	86	71	46	37	44	28	36	41	26	13
383	Electrical apparatus and supplies	225	13 477	87	39	78	39	45	38	27	31	36	21	24	5
384	Transport equipment	381	18 098	142	37	74	66	46	31	28	20	24	48	34	19
385	Scientific instr. / optical goods	48	1 594	17	35	67	8	47	52	5	29	10	4	24	4
39	Other manufacturing industries ...	104	3 627	34	33	66	15	44	41	7	21	12	12	35	14

N is the number of enterprises
t is the sample fraction
s is the response rate; the number of enterprises in the net sample in per cent of the gross sample
d is the coverage rate; the number of persons engaged in the sample in per cent of the population

Tabel 2. Key figures for enterprises with and without innovations. 1992

Industry/ Size class	With innovations					Without innovations				
	Enterprises	Persons eng. per. enterprise	Sales per. person engaged	Capital formation per. empl.	Export share	Enterprises	Persons eng. per. enterprise	Sales per. person engaged	Capital formation per. empl.	Export share
			1 000 NOK					1 000 NOK		
2,3 OIL EXTR., MINING AND MANUFACTURING	400	236	2 215	246	59	586	44	1 105	31	29
2-22 Mining and quarrying	5	239	818	47	55	17	34	1 458	64	40
22 Crude petroleum/natural gas prod.	10	1711	6 247	1 083	76	.	.	.	.	.
3 MANUFACTURING	385	198	1 330	60	41	569	44	1 097	30	28
- 20 employees	82	10	1 204	56	7	341	9	906	22	12
20 - 49 "	66	34	865	66	26	101	31	970	21	19
50 - 99 "	73	74	1 219	62	33	59	68	1 061	22	23
100 - 199 "	73	139	1 133	42	41	47	134	1 081	44	21
200 - "	91	631	1 395	63	43	21	415	1 240	31	42
No export	124	141	1 561	50	0	362	34	959	23	0
- 20 pct. export	93	163	977	51	6	101	43	1 062	35	6
20 - 39 "	47	173	1 107	54	26	33	91	1 041	23	29
40 - 79 "	62	260	1 465	76	61	44	73	1 098	42	66
80 - "	59	324	1 379	66	92	29	78	1 991	55	96
- 10 in innov-int	70	249	1 035	27	25	569	44	1 097	30	28
10- 19 "	57	211	1 332	61	39	.	.	.	.	.
20- 39 "	87	183	1 418	55	15	.	.	.	.	.
40- 59 "	56	155	1 339	57	47	.	.	.	.	.
60- 99 "	52	210	1 355	67	75	.	.	.	.	.
100- "	63	176	1 632	115	62	.	.	.	.	.
31 Food, beverages and tobacco	67	188	1 982	62	7	116	40	1 331	39	20
- 50 employees	28	26	1 502	78	24	96	14	1 386	33	18
50 - 149 "	20	87	2 050	65	22	13	84	1 697	36	13
150 - "	19	533	2 005	60	4	7	309	1 112	43	28
No export	36	164	2 727	50	0	88	33	1 399	28	0
- 40 pct. export	15	342	1 411	77	7	8	51	1 666	74	9
40 - "	16	97	1 040	55	82	20	64	1 071	51	86
- 20 in innov-int	26	184	1 728	35	6	116	40	1 331	39	20
20 - 59 "	23	301	2 045	73	6	.	.	.	.	.
60 - "	18	49	2 867	118	17	.	.	.	.	.
311/2 Food	62	171	2 153	50	8	109	30	1 319	37	29
313/4 Beverages and tobacco	5	397	1 065	127	1	7	195	1 360	41	0
32 Textiles, wearing apparel, leather	15	70	678	20	28	34	29	670	14	30
321 Textiles	9	93	723	16	30	21	32	663	13	23
322 Wearing apparel, ex. footwear	3	26	528	29	17	10	23	539	6	10
323 Leather, except wearing apparel ..	3	45	485	41	16	2	41	1 123	45	92
324 Footwear	.	.	.	.	.	1	8	450	0	30
33 Wood	29	66	888	77	33	74	33	982	48	15
331 Wood products, except furniture ..	17	54	986	138	26	53	34	1 018	62	19
332 Furniture and fixtures	12	82	797	20	42	21	32	886	8	5
34 Paper, printing and publishing ...	58	182	1 348	76	37	90	43	1 078	37	20
341 Paper	13	405	1 519	100	64	8	111	1 388	38	61
342 Printing, publishing, allied ind.	45	118	1 178	53	2	82	37	988	36	3

Exportshare is exports in per cent of sales
Innov-int is innovation costs per. person engaged in 1 000 NOK

Table 2(cont.). Key figures for enterprises with and without innovations. 1992

Industry/ Size class	With innovations					Without innovations				
	Enterprises	Persons eng. per. enterprise	Sales per. person engaged	Capital formation per. empl.	Export share	Enterprises	Persons eng. per. enterprise	Sales per. person engaged	Capital formation per. empl.	Export share
			1 000 NOK					1 000 NOK		
351/2 Chemicals	18	380	2 137	124	62	3	67	1 215	58	21
351 Industrial chemicals	11	352	2 557	165	61	.	.	.	.	.
352 Other chemical products	7	423	1 588	71	62	3	67	1 215	58	21
354/6 Rubber and plastic products	11	171	1 044	34	22	12	26	902	43	27
354 Products of petroleum and coal	1	1000	1 100	40	5	.	.	.	.	.
355 Manufact./ repair of rubber prod.	1	240	633	20	68	2	8	1 400	0	0
356 Plastic products	9	71	1 113	30	39	10	30	877	45	30
36 Mineral products	16	134	833	38	27	26	26	1 326	56	13
361 Ceramics	3	182	409	14	18	.	.	.	.	.
362 Glass and glass prod.	4	156	883	54	30	3	117	815	68	29
369 Other mineral products	9	108	1 040	41	28	23	15	1 857	43	6
371 Iron, steel and ferroalloys	8	286	1 459	49	70	6	81	1 588	10	95
372 Non-ferrous metals	9	939	1 550	84	90	4	35	941	30	57
38 Fabr. machinery and equipment	147	190	876	36	41	192	58	1 067	21	35
- 50 employees	55	20	676	35	21	145	16	759	15	14
50 - 149 "	46	91	888	40	48	28	79	873	20	17
150 - "	46	493	883	36	40	19	344	1 241	23	43
No export	34	193	784	34	0	118	51	830	15	0
- 40 pct. export	62	148	787	42	16	49	60	942	15	23
40 - «	51	240	991	33	73	25	82	1 940	47	87
- 20 in innov-int	46	247	763	21	25	192	58	1 067	21	35
20 - 59 "	57	160	879	38	38	.	.	.	.	.
60 - "	44	169	1 045	58	62	.	.	.	.	.
381 Metal products	43	113	563	28	33	78	24	669	19	15
382 Machinery	44	320	863	41	31	41	123	1 025	15	15
383 Electrical apparatus and supplies	27	172	1 087	35	45	21	25	604	9	18
384 Transport equipment	28	151	1 041	30	66	48	73	1 415	33	62
385 Scientific instr. / optical goods	5	30	1 005	41	60	4	16	905	20	22
39 Other manufacturing industries	7	59	717	20	22	12	38	453	33	26

Exportshare is exports in per cent of sales
Innov-int is innovation costs per. person engaged in 1 000 NOK

Table 3. Innovation costs for the population, net sample and enterprises with innovations. 1992

Industry/ Size class	Population	Net sample			Innovative enterprises	
	Innovation costs	Innovation costs	Per person engaged	Per thousand of sales	Per person engaged	Per thousand of sales
	Mill. NOK	1000 NOK			1000NOK	
2,3 OIL EXTR., MINING AND MANUFACTURING	11 609	6 606	55	28	70	32
2-22 Mining and quarrying	87	39	22	22	33	40
22 Crude petroleum/natural gas prod.	2 649	2 388	140	22	140	22
3 MANUFACTURING	8 873	4 179	41	32	55	41
- 10 employees	311	29	21	23	128	100
10 - 49 "	1 534	176	22	23	62	67
50 - 99 "	904	380	40	35	70	58
100 - "	6 123	3 592	44	33	53	32
No export	.	339	11	9	19	12
- 20 pct. export	.	520	27	27	34	35
20 - 39 "	.	413	37	34	51	46
40 - 79 "	.	1 149	59	42	71	49
80 - "	.	1 757	82	57	92	67
- 10 in innov-int	.	87	2	2	5	5
10- 19 "	.	156	13	10	13	10
20- 39 "	.	446	28	20	28	20
40- 59 "	.	432	50	37	50	37
60- 99 "	.	776	71	52	71	52
100- "	.	2 279	205	126	205	126
31 Food, beverages and tobacco	1 303	416	24	13	33	17
- 10 employees	127	6	24	19	316	64
10 - 49 "	450	37	21	14	53	38
50 - 99 "	180	92	58	27	95	42
100 - "	546	280	21	11	26	13
No export	.	114	13	6	19	7
- 40 pct. export	.	219	40	28	43	30
40 - «	.	83	29	28	54	52
- 20 in innov-int	.	32	3	2	7	4
20 - 59 "	.	203	29	14	29	14
60 - "	.	180	206	72	206	72
311/2 Food	1 184	331	24	12	31	15
313/4 Beverages and tobacco	119	85	26	22	43	40
32 Textiles, wearing apparel, leather	93	28	14	20	27	40
321 Textiles	48	19	13	19	24	33
322 Wearing apparel, ex. footwear	37	4	16	30	64	120
323 Leather, except wearing apparel	8	3	16	22	25	52
324 Footwear	0	.	.	.	.	.
33 Wood	581	134	31	33	70	79
331 Wood products, except furniture	484	105	39	39	114	116
332 Furniture and fixtures	97	29	17	21	29	37
34 Paper, printing and publishing	636	292	20	16	28	21
341 Paper	233	142	23	15	27	18
342 Printing, publishing, allied ind.	403	149	18	16	28	24

Innov-int is innovation costs per. person engaged in 1000 NOK

Table 3(cont.). Innovation costs for the population, net sample and enterprises with innovations.

Industry/ Size class	Population	Net sample			Innovative enterprises	
	Innovation costs	Innovation costs	Per person engaged	Per thousand of sales	Per person engaged	Per thousand of sales
	Mill. NOK	1000 NOK			1000NOK	
351/2 Chemicals	1 471	823	117	55	120	56
351 Industrial chemicals	578	347	90	35	90	35
352 Other chemical products	893	475	150	96	160	101
354/6 Rubber and plastic products	144	34	16	15	18	17
354 Products of petroleum and coal	16	8	8	7	8	7
355 Manufact./ repair of rubber prod.	12	9	35	52	38	59
356 Plastic products	106	17	18	18	27	24
36 Mineral products	107	45	16	17	21	25
361 Ceramics	9	8	15	36	15	36
362 Glass and glass prod	17	12	13	15	21	23
369 Other mineral products	81	24	19	15	25	24
371 Iron, steel and ferroalloys	134	57	21	14	25	17
372 Non-ferrous metals	628	575	67	43	68	44
38 Fabr. machinery and equipment	3 769	1 765	45	49	63	72
- 10 employees	88	11	25	32	118	141
10 - 49 "	359	45	15	21	46	69
50 - 99 "	375	137	40	51	64	77
100 - "	2 947	1 571	49	51	64	72
No export	.	79	6	8	12	15
- 40 pct. export	.	312	26	31	34	43
40 - «	.	1 374	96	85	112	113
- 20 in innov-int	.	72	3	4	6	8
20 - 59 "	.	363	40	45	40	45
60 - "	.	1 329	179	171	179	171
381 Metal products	422	165	24	41	34	60
382 Machinery	1 393	654	34	38	47	54
383 Electrical apparatus and supplies	1 399	692	134	129	149	137
384 Transport equipment	434	233	30	25	55	53
385 Scientific instr. / optical goods	121	20	96	98	137	136
39 Other manufacturing industries	20	6	8	14	16	23

Innov-int is innovation costs per. person engaged in 1000 NOK

Table 4. Operating costs distributed by innovative activities. 1992. Percentage

Industry/ Size class	Total	Fixed captial formation for innovation in per cent of		Operating cost for innovative activities							
				Per-cent of Inno-vation costs	Of which per-cent bought ser-vices	Innovative activities					
		Total fixed capital format.	Inno-va-tion costs			R&D	Pro-duct-de-sign	Trial-pro-duc-tion	Patents and licen-ses	Mar-ket ana-lysis	Ot-hers
	Mill.NOK										
2,3 OIL EXTR., MINING AND MANUFACTURING	6 606	9	30	70	26	67	10	11	5	3	5
2-22 Mining and quarrying	39	41	59	41	29	46	0	44	.	7	3
22 Crude petroleum/natural gas prod.	2 388	4	28	72	43	78	1	8	3	3	7
3 MANUFACTURING	4 179	28	31	69	16	60	15	12	6	3	4
- 20 employees	71	63	42	58	23	36	10	27	10	4	13
20 - 49 "	134	58	64	36	14	27	13	37	10	6	7
50 - 99 "	380	59	52	48	24	53	14	18	2	5	7
100 - 199 "	505	48	41	59	14	49	15	17	5	3	11
200 - "	3 086	22	26	74	15	63	15	10	6	2	3
No export	339	27	72	28	17	38	9	30	5	2	16
- 20 pct. export	520	31	46	54	15	54	11	13	3	4	15
20 - 39 "	413	46	50	50	13	67	9	14	3	3	4
40 - 79 "	1 149	19	20	80	5	47	25	13	9	3	3
80 - "	1 757	30	22	78	23	71	10	10	4	3	2
- 10 in innov-int	87	7	38	62	13	51	17	15	0	6	11
10- 19 "	156	11	52	48	8	63	12	12	0	3	5
20- 39 "	446	29	57	43	19	49	17	20	4	3	7
40- 59 "	432	44	51	49	18	52	17	20	2	3	5
60- 99 "	776	32	30	70	21	63	5	14	9	4	5
100- "	2 279	38	21	79	14	62	17	10	6	2	3
31 Food, beverages and tobacco	416	28	52	48	23	60	5	14	2	4	15
- 50 employees	44	45	58	42	20	17	9	44	12	9	9
50 - 149 "	125	41	37	63	28	56	4	8	1	4	28
150 - "	247	23	58	42	21	70	6	12	1	4	7
No export	114	27	71	29	19	31	10	35	6	3	16
- 40 pct. export	219	22	41	59	20	63	5	9	1	4	19
40 - "	83	52	54	46	37	74	1	12	3	8	2
- 20 in innov-int	32	11	59	41	25	34	23	19	1	13	10
20 - 59 "	203	28	70	30	29	60	5	21	2	3	9
60 - "	180	53	30	70	20	62	3	9	2	4	19
311/2 Food	331	34	55	45	22	63	6	14	2	6	9
313/4 Beverages and tobacco	85	13	39	61	26	49	2	13	1	.	35
32 Textiles, wearing apparel, leather	28	44	33	67	14	22	20	34	11	3	11
321 Textiles	19	44	30	70	15	18	24	35	14	4	6
322 Wearing apparel, ex. footwear	4	65	31	69	13	46	9	26	3	2	14
323 Leather, except wearing apparel	3	34	56	44	0	.	.	54	.	.	46
324 Footwear	.	.	.	.	.	.	.	.	.	.	.
33 Wood	134	70	77	23	27	16	26	34	8	5	11
331 Wood products, except furniture	105	72	87	13	38	6	3	48	15	7	22
332 Furniture and fixtures	29	56	40	60	18	24	45	23	2	3	2
34 Paper, printing and publishing	292	20	54	46	12	59	6	13	6	3	13
341 Paper	142	9	32	68	10	75	4	9	3	3	6
342 Printing, publishing, allied ind.	149	40	75	25	16	20	10	23	13	4	31

Innov-int is innovation costs per. person engaged in 1000 NOK

Table 4(cont.). Operating costs distributed by innovative activities. 1992. Percentage

Industry/ Size class		Total	Fixed captial formation for innovation in per cent of		Operating cost for innovative activities							
			Total fixed capital format.	Innovation costs	Percent of Innovation costs	Of which percent bought services	Innovative activities					
							R&D	Product-design	Trial-production	Patents and licenses	Market analysis	Others
		Mill.NOK										
51/2	Chemicals	823	26	27	73	11	89	2	4	1	2	1
351	Industrial chemicals	347	24	43	57	8	88	0	4	2	2	2
352	Other chemical products	475	34	15	85	12	90	3	4	1	2	0
354/6	Rubber and plastic products	34	25	47	53	6	65	6	20	4	0	5
354	Products of petroleum and coal	8	3	13	88	0	100	.	.	.	.	.
355	Manufact./ repair of rubber prod.	9	80	44	56	5	70	5	20	.	.	5
356	Plastic products	17	56	64	36	14	22	13	42	11	0	11
36	Mineral products	45	28	51	49	15	52	17	18	5	4	4
361	Ceramics	8	47	48	53	10	31	52	5	4	7	1
362	Glass and glass prod.	12	23	60	40	11	15	24	46	9	2	4
369	Other mineral products	24	28	47	53	18	74	3	12	3	3	5
371	Iron, steel and ferroalloys	57	38	75	25	13	56	7	21	5	8	3
372	Non-ferrous metals	575	18	22	78	24	68	4	10	10	4	4
38	Fabr. machinery and equipment	1 765	38	22	78	14	47	26	15	7	3	3
	- 50 employees	56	51	35	65	17	43	15	27	5	4	5
	50 - 149 "	287	42	24	76	16	49	19	19	5	4	4
	150 - "	1 421	36	21	79	14	47	27	14	7	2	3
	No export	79	20	59	41	22	58	7	22	0	2	11
	- 40 pct. export	312	45	56	44	11	46	17	23	2	5	7
	40 - «	1 374	41	12	88	14	47	27	14	8	2	2
	- 20 in innov-int	72	11	39	61	12	48	17	17	1	3	15
	20 - 59 "	363	47	45	55	17	43	26	20	2	4	5
	60 - "	1 329	45	15	85	14	48	26	14	8	2	2
381	Metal products	165	59	50	50	10	36	11	31	1	5	16
382	Machinery	654	29	26	74	7	50	16	10	17	4	3
383	Electrical apparatus and supplies	692	57	14	86	12	42	38	16	2	1	1
384	Transport equipment	233	31	17	83	43	58	18	16	2	2	4
385	Scientific instr. / optical goods	20	40	12	88	16	49	25	17	0	8	.
39	Other manufacturing industries	6	15	19	81	14	43	34	18	4	.	0

Innov-int is innovation costs per. person engaged in 1000 NOK

Table 5. Innovation-, R&D- and marketing costs for enterprises with innovations. 1992

Industry/ Size class	Innovation		R&D - Research and Development					Marketing cost	
	Total	Per. person engaged	Total	Per. person engaged	Pro- duct	Pro- cess	Ext. ser- vices	Total	Per. person engaged
	Mill.	1 000	Mill.	1000 NOK	Percentage			Mill.	1000NOK
2,3 OIL EXTR., MINING AND MANUFACTURING	6 606	70	3 729	40	40	32	32	3 132	33
2-22 Mining and quarrying	39	33	10	9	28	66	52	23	20
22 Crude petroleum/natural gas prod.	2 388	140	1 532	90	15	47	51	743	43
3 MANUFACTURING	4 179	55	2 187	29	57	21	18	2 365	31
- 20 employees	71	84	20	24	70	23	11	24	28
20 - 49 "	134	61	20	9	65	16	13	48	22
50 - 99 "	380	70	124	23	63	25	35	171	32
100 - 199 "	505	50	213	21	72	21	13	369	36
200 - "	3 086	54	1 808	31	55	21	18	1 751	30
No export	339	19	60	3	31	51	15	325	19
- 20 pct. export	520	34	200	13	60	25	14	543	36
20 - 39 "	413	51	238	29	72	17	13	422	52
40 - 79 "	1 149	71	529	33	52	23	11	544	34
80 - "	1 757	92	1 158	61	58	19	24	529	28
- 10 in innov-int	87	5	35	2	29	55	17	221	13
10- 19 "	156	13	62	5	54	38	22	204	17
20- 39 "	446	28	136	9	51	30	20	548	35
40- 59 "	432	50	246	28	65	28	17	320	37
60- 99 "	776	71	394	36	20	15	19	368	34
100- "	2 279	205	1 311	118	69	20	18	701	63
31 Food, beverages and tobacco	416	33	152	12	52	28	28	358	28
- 50 employees	44	60	5	8	39	48	13	17	24
50 - 149 "	125	72	53	31	62	30	43	51	30
150 - "	247	24	92	9	47	25	20	289	29
No export	114	19	17	3	38	40	27	70	12
- 40 pct. export	219	43	102	20	52	23	21	253	49
40 - «	83	54	33	21	61	35	49	35	23
- 20 in innov-int	32	7	13	3	51	15	12	82	17
20 - 59 "	203	29	47	7	27	33	34	223	32
60 - "	180	206	91	105	65	27	27	52	60
311/2 Food	331	31	126	12	58	30	24	248	23
313/4 Beverages and tobacco	85	43	26	13	22	15	48	110	55
32 Textiles, wearing apparel, leather	28	27	12	12	68	28	7	33	32
321 Textiles	19	24	10	13	67	33	5	30	36
322 Wearing apparel, ex. footwear	4	64	1	22	74	0	25	2	32
323 Leather, except wearing apparel ..	3	25	0	0	.	.	.	0	5
33 Wood	134	70	14	8	39	55	14	47	25
331 Wood products, except furniture ..	105	114	7	8	26	67	7	21	23
332 Furniture and fixtures	29	29	7	7	52	43	20	26	27
34 Paper, printing and publishing ...	292	28	113	11	53	39	14	235	22
341 Paper	142	27	101	19	57	37	15	34	7
342 Printing, publishing, allied ind.	149	28	11	2	18	56	10	201	38

Innov-int is innovation costs per. person engaged in 1000 NOK

Table 5(cont.). Innovation-, R&D- and marketing costs for enterprises with innovations. 1992

Industry/ Size class	Innovation		R&D - Research and Development					Marketing cost	
	Total	Per. person engaged	Total	Per. person engaged	Pro- duct	Pro- cess	Ext. ser- vices	Total	Per. person engaged
	Mill.	1 000	Mill.	1000 NOK	Percentage			Mill.	1000NOK
351/2 Chemicals	823	120	593	87	67	13	12	546	80
351 Industrial chemicals	347	90	184	48	21	20	8	290	75
352 Other chemical products	475	160	409	138	88	10	13	256	87
354/6 Rubber and plastic products	34	18	11	6	40	52	4	80	43
354 Products of petroleum and coal	8	8	7	7	40	60	0	50	50
355 Manufact./ repair of rubber prod.	9	38	3	15	50	30	7	6	25
356 Plastic products	17	27	1	2	18	68	14	24	38
36 Mineral products	45	21	21	10	53	30	15	84	39
361 Ceramics	8	15	2	5	70	27	13	21	39
362 Glass and glass prod.	12	21	4	7	32	37	9	11	18
369 Other mineral products	24	25	14	15	57	28	18	51	53
371 Iron, steel and ferroalloys	57	25	11	5	59	41	34	40	18
372 Non-ferrous metals	575	68	358	42	3	29	25	159	19
38 Fabr. machinery and equipment	1 765	63	894	32	75	19	20	766	27
- 50 employees	56	52	22	21	75	12	14	23	22
50 - 149 "	287	69	148	36	80	12	21	126	30
150 - "	1 421	63	722	32	74	21	20	616	27
No export	79	12	21	3	42	40	13	22	3
- 40 pct. export	312	34	156	17	71	18	13	253	28
40 - «	1 374	112	715	58	77	19	22	490	40
- 20 in innov-int	72	6	30	3	23	61	17	76	7
20 - 59 "	363	40	197	22	73	20	17	341	37
60 - "	1 329	179	666	90	78	17	21	348	47
381 Metal products	165	34	85	17	43	41	2	95	20
382 Machinery	654	47	341	24	79	15	12	367	26
383 Electrical apparatus and supplies	692	149	316	68	78	19	18	206	45
384 Transport equipment	233	55	141	33	76	20	53	74	18
385 Scientific instr. / optical goods	20	137	9	63	95	2	26	22	151
39 Other manufacturing industries	6	16	2	6	50	20	19	11	28

Innov-int is innovation costs per. person engaged in 1000 NOK

Table 6. Output of product innovations: Sales proportion of significantly changed or new products. 1992. Percentage

Industry/ Size class	Enterprises	Persons eng. per enterprise	Sales per. person eng.	Export share	Fixed capital f. per person engaged	Innovation costs per pers. eng.	Dergee of product change: No	Incremental	Significant
			1000NOK		1 000 NOK				
2,3 OIL EXTR., MINING AND MANUFACTURING	272	241	2 182	61	182	78	75	17	8
2-22 Mining and quarrying	4	297	818	56	47	33	95	2	3
22 Crude petroleum/natural gas prod	3	3 428	7 366	73	867	155	79	17	4
3 MANUFACTURING	265	204	1 228	47	56	64	69	18	13
- 20 employees	51	10	1 234	8	52	99	52	19	29
20 - 49 "	46	33	889	29	51	50	66	16	19
50 - 99 "	50	73	1 309	31	74	88	62	20	19
100 - 199 "	52	138	1 119	43	38	54	60	18	22
200 - "	66	625	1 253	51	57	64	72	17	11
No export	60	115	1 338	0	50	19	68	16	16
- 20 pct. export	69	178	1 001	6	51	33	60	25	16
20 - 39 "	38	181	1 077	26	53	55	59	19	22
40 - 79 "	53	219	1 281	55	54	80	72	17	11
80 - "	45	365	1 379	91	63	100	77	14	9
- 10 in innov-int	36	320	846	39	24	5	78	17	5
10- 19 "	41	136	1 013	28	30	14	79	16	5
20- 39 "	59	196	1 251	21	57	28	54	25	21
40- 59 "	39	170	1 342	49	53	50	66	20	14
60- 99 "	43	221	1 424	76	59	69	87	6	7
100- "	47	199	1 519	61	105	216	60	20	19
31 Food, beverages and tobacco	43	194	1 698	9	68	41	56	23	21
- 50 employees	17	30	1 572	28	94	70	61	18	21
50 - 149 "	16	86	2 032	21	73	84	69	10	21
150 - "	10	645	1 637	5	65	29	53	26	21
No export	17	130	2 685	0	50	27	66	11	23
- 40 pct. export	15	342	1 411	7	78	43	47	32	21
40 - «	11	90	986	83	54	62	68	24	8
- 20 in innov-int	13	200	1 451	12	34	9	81	15	4
20 - 59 "	15	328	1 622	6	77	29	51	29	20
60 - "	15	54	2 948	16	120	213	36	12	52
311/2 Food	39	168	1 885	10	49	40	60	18	22
313/4 Beverages and tobacco	4	443	1 006	1	137	45	33	57	11
32 Textiles, wearing apparel, leather	11	82	657	26	19	29	76	13	10
321 Textiles	7	102	708	27	17	26	75	14	10
322 Wearing apparel, ex. footwear	3	25	528	17	30	64	57	17	26
323 Leather, except wearing apparel ..	1	112	419	20	26	23	100	.	.
33 Wood	22	64	806	38	49	50	48	35	16
331 Wood products, except furniture ..	11	45	888	26	101	86	77	11	12
332 Furniture and fixtures	11	82	760	46	21	30	30	51	19
34 Paper, printing and publishing ...	18	152	1 355	44	69	48	80	15	6
341 Paper	8	282	1 328	54	71	45	77	17	5
342 Printing, publishing, allied ind.	10	48	1 481	3	60	63	90	4	6

Innov-int is innovation costs per. person engaged in 1000 NOK

Table 6(cont.). Output of product innovations: Sales proportion of significantly changed or new products. 1992. Percentage

Industry/ Size class	Enterprises	Persons eng. per enterprise	Sales per. person eng.	Export share	Fixed capital f. per person engaged	Innovation costs per pers. eng.	Dergee of product change: No	Incremental	Significant
			1000NOK		1 000 NOK				
351/2 Chemicals	14	384	2 034	56	117	125	81	10	8
351 Industrial chemicals	7	346	2 580	51	173	82	84	9	7
352 Other chemical products	7	423	1 588	62	71	160	78	12	10
354/6 Rubber and plastic products	10	175	1 034	17	34	18	88	10	3
354 Products of petroleum and coal	1	1 000	1 100	5	40	8	97	3	.
355 Manufact./ repair of rubber prod.	1	240	633	68	21	38	70	20	10
356 Plastic products	8	64	1 094	28	29	29	74	20	6
36 Mineral products	14	139	749	19	37	21	76	11	13
361 Ceramics	3	182	409	18	15	15	59	31	10
362 Glass and glass prod.	3	196	859	30	56	22	69	11	19
369 Other mineral products	8	102	898	13	37	26	86	4	10
371 Iron, steel and ferroalloys	7	276	1 422	65	43	22	91	7	2
372 Non-ferrous metals	6	1 185	1 584	90	79	71	91	4	5
38 Fabr. machinery and equipment	115	195	826	51	34	72	52	29	19
- 50 employees	41	21	695	24	33	54	53	19	28
50 - 149 "	37	91	865	52	39	71	52	30	18
150 - "	37	490	825	52	33	73	52	29	19
No export	20	200	534	0	30	9	62	35	4
- 40 pct. export	45	140	717	16	36	35	54	20	26
40 - «	50	242	980	73	34	112	50	31	19
- 20 in innov-int	33	245	588	39	18	6	66	24	10
20 - 59 "	46	160	892	46	31	41	46	29	25
60 - "	36	193	1 033	64	55	182	49	31	19
381 Metal products	34	130	528	36	24	31	60	23	18
382 Machinery	29	326	773	48	41	59	56	28	16
383 Electrical apparatus and supplies	24	178	1 029	48	33	156	48	30	22
384 Transport equipment	24	171	1 055	67	30	56	45	33	22
385 Scientific instr. / optical goods	4	35	984	65	42	142	71	17	12
39 Other manufacturing industries	5	46	734	34	10	27	62	30	8

Innov-int is innovation costs per. person engaged in 1000 NOK

Table 7. Output of product innovations: Export proportion of significantly changed or new products. 1992. Percentage

Industry/ Size class	Enterprises	Persons eng. per. enterprise	Sales per. person eng.	Export share	Fixed capital f. per. person engaged	Innovation costs per. pers. eng.	Dergee of product change: No	Dergee of product change: Incremental	Dergee of product change: Significant
			1000NOK		1 000 NOK				
2,3 OIL EXTR., MINING AND MANUFACTURING	210	278	2 285	65	199	85	78	16	6
2-22 Mining and quarrying	4	297	818	56	47	33	92	3	5
22 Crude petroleum/natural gas prod.	3	3 428	7 366	73	867	155	80	16	4
3 MANUFACTURING	203	231	1 213	55	56	71	73	16	10
- 20 employees	22	12	994	20	32	87	50	17	33
20 - 49 "	34	33	824	42	49	54	71	12	17
50 - 99 "	42	74	1 167	40	81	98	56	26	17
100 - 199 "	47	138	1 080	47	39	57	57	20	23
200 - "	58	621	1 255	58	58	72	77	15	8
- 20 pct. export	68	179	1 003	6	51	33	50	40	9
20 - 39 "	38	181	1 077	26	53	55	59	20	21
40 - 79 "	53	219	1 281	55	54	80	72	19	10
80 - "	44	371	1 378	91	64	100	76	14	10
- 10 in innov-int	26	289	925	52	24	6	69	25	6
10- 19 "	30	166	884	35	31	14	79	15	5
20- 39 "	48	208	1 064	28	50	29	49	30	21
40- 59 "	29	208	1 364	53	49	51	72	18	11
60- 99 "	32	288	1 405	79	60	69	89	5	6
100- "	38	243	1 495	62	105	216	65	20	14
31 Food, beverages and tobacco	26	235	1 342	16	74	46	52	34	14
- 50 employees	9	37	1 238	55	70	62	82	12	6
50 - 149 "	11	93	1 674	34	84	100	67	10	24
150 - "	6	795	1 278	8	72	33	18	76	6
- 40 pct. export	15	342	1 411	7	78	43	24	54	22
40 - «	11	90	986	83	54	62	67	23	10
- 20 in innov-int	8	219	931	27	38	9	61	34	5
20 - 59 "	8	460	1 250	10	82	30	44	53	3
60 - "	10	69	2 864	19	126	224	50	12	38
311/2 Food	23	191	1 475	19	51	46	51	35	14
313/4 Beverages and tobacco	3	575	1 001	1	133	45	83	11	6
32 Textiles, wearing apparel, leather	11	82	657	26	19	29	77	11	12
321 Textiles	7	102	708	27	17	26	76	12	12
322 Wearing apparel, ex. footwear	3	25	528	17	30	64	67	12	21
323 Leather, except wearing apparel ..	1	112	419	20	26	23	100	.	.
33 Wood	16	82	813	40	51	50	38	47	15
331 Wood products, except furniture ..	8	60	892	27	105	87	75	9	16
332 Furniture and fixtures	8	105	768	49	21	29	25	61	14
34 Paper, printing and publishing ...	9	256	1 295	50	74	49	82	17	2
341 Paper	7	307	1 324	51	73	47	81	17	2
342 Printing, publishing, allied ind.	2	76	870	17	91	76	97	.	3

Innov-int is innovation costs per. person engaged in 1000 NOK

Table 7(cont.). Output of product innovations: Export proportion of significantly changed or new products. 1992. Percentage

Industry/ Size class	Enterprises	Persons eng. per. enterprise	Sales per. person eng.	Export share	Fixed capital f. per. person engaged	Innovation costs per. pers. eng.	Dergee of product change: No	Incremental	Significant
			1000NOK		1 000 NOK				
351/2 Chemicals	13	391	2 055	58	104	131	82	8	10
351 Industrial chemicals	6	353	2 709	56	151	89	82	10	8
352 Other chemical products	7	423	1 588	62	71	160	81	6	13
354/6 Rubber and plastic products	8	217	1 025	18	34	18	81	10	9
354 Products of petroleum and coal	1	1 000	1 100	5	40	8	97	3	.
355 Manufact./ repair of rubber prod.	1	240	633	68	21	38	80	10	10
356 Plastic products	6	83	1 066	29	28	28	77	12	11
36 Mineral products	10	189	740	20	37	20	64	6	30
361 Ceramics	3	182	409	18	15	15	72	26	3
362 Glass and glass prod.	3	196	859	30	56	22	51	.	49
369 Other mineral products	4	191	885	14	38	23	81	8	11
371 Iron, steel and ferroalloys	7	276	1 422	65	43	22	90	8	2
372 Non-ferrous metals	6	1 185	1 584	90	79	71	92	4	5
38 Fabr. machinery and equipment	95	193	890	58	35	86	49	32	18
- 50 employees	29	22	664	34	37	55	48	13	39
50 - 149 "	33	92	923	55	42	77	46	32	21
150 - "	33	446	893	59	33	89	50	33	17
- 40 pct. export	45	140	717	16	36	35	58	18	24
40 - «	50	242	980	73	34	112	49	33	18
- 20 in innov-int	24	193	687	58	13	9	56	32	13
20 - 59 "	40	172	882	49	29	41	47	30	23
60 - "	31	222	1 034	64	55	182	49	34	18
381 Metal products	27	147	541	39	24	33	53	22	26
382 Machinery	23	273	926	60	48	87	55	35	10
383 Electrical apparatus and supplies	20	209	1 036	49	33	158	34	37	29
384 Transport equipment	21	181	1 031	74	26	57	52	29	19
385 Scientific instr. / optical goods	4	35	984	65	42	142	67	16	17
39 Other manufacturing industries	2	102	709	40	9	28	20	75	5

Innov-int is innovation costs per. person engaged in 1000 NOK

Table 8. Output of product innovations: Sales proportion by phases of products' sales life-cycle. 1992. Percentage

Industry/ Size class	Enterprises	Persons eng. per. enterprise	Sales per. person eng.	Export share	Fixed capital f. per. person engaged	Innovation costs per. pers. eng.	Phases of the product life-cycle: Introduction	Growth	Maturity	Decline
			1000NOK		1 000 NOK					
2,3 OIL EXTR., MINING AND MANUFACTURING	237	252	2 135	58	164	79	10	21	58	11
2-22 Mining and quarrying	3	379	804	55	44	24	2	5	78	14
22 Crude petroleum/natural gas prod.	1	8 900	7 202	68	775	146	10	20	60	10
3 MANUFACTURING	233	213	1 260	49	57	69	10	22	56	11
- 20 employees	38	10	959	13	38	93	26	20	43	11
20 - 49 "	35	33	918	27	57	51	9	25	51	15
50 - 99 "	49	73	1 250	33	76	92	12	30	41	17
100 - 199 "	49	139	1 136	44	37	56	11	28	51	10
200 - "	62	610	1 297	52	59	69	10	20	59	11
No export	46	90	1 767	0	61	26	27	19	49	4
- 20 pct. export	62	193	1 011	6	52	34	11	28	50	11
20 - 39 "	32	195	1 100	26	52	59	8	26	55	11
40 - 79 "	51	221	1 276	54	55	82	10	14	54	22
80 - "	42	383	1 364	92	64	100	5	23	64	8
- 10 in innov-int	30	284	937	43	23	6	4	13	64	20
10- 19 "	32	152	972	31	28	14	7	20	62	11
20- 39 "	55	207	1 257	21	57	28	18	25	45	13
40- 59 "	34	182	1 306	46	52	50	14	20	53	13
60- 99 "	40	237	1 425	76	59	69	7	10	80	4
100- "	42	221	1 512	61	105	216	9	38	41	12
31 Food, beverages and tobacco	37	219	1 665	9	68	40	19	30	44	7
- 50 employees	13	32	1 279	30	96	56	7	30	53	10
50 - 149 "	14	88	1 946	24	78	93	17	35	35	13
150 - "	10	645	1 637	5	65	29	20	29	46	6
No export	13	161	2 575	0	49	24	28	20	48	4
- 40 pct. export	14	361	1 420	7	79	43	13	38	40	9
40 - «	10	95	967	82	53	59	7	21	60	12
- 20 in innov-int	11	224	1 375	13	34	8	5	21	65	10
20 - 59 "	13	375	1 612	6	78	29	24	29	41	6
60 - "	13	58	2 948	14	119	215	19	48	27	7
311/2 Food	34	188	1 838	10	49	38	17	29	48	7
313/4 Beverages and tobacco	3	566	1 015	1	143	47	29	39	23	8
32 Textiles, wearing apparel, leather	7	94	734	29	19	33	11	23	47	20
321 Textiles	5	124	740	29	18	29	11	22	47	21
322 Wearing apparel, ex. footwear	2	20	639	24	34	93	7	38	49	6
33 Wood	19	66	794	40	45	52	9	18	55	19
331 Wood products, except furniture ..	8	44	883	25	106	109	5	11	62	22
332 Furniture and fixtures	11	82	760	46	21	30	11	21	52	17
34 Paper, printing and publishing ...	13	171	1 443	48	72	54	7	13	74	7
341 Paper	7	271	1 386	58	74	51	7	13	74	6
342 Printing, publishing, allied ind.	6	56	1 765	4	62	71	4	13	74	9

Innov-int is innovation costs per. person engaged in 1000 NOK

Table 8(cont.). Output of product innovations: Sales proportion by phases of products' sales life-cycle. 1992. Percentage

Industry/ Size class	Enterprises	Persons eng. per. enterprise	Sales per. person eng.	Export share	Fixed capital f. per. person engaged	Innovation costs per. pers. eng.	Phases of the product life-cycle: Introduction	Growth	Maturity	Decline
			1000NOK		1 000 NOK					
351/2 Chemicals	14	384	2 034	56	117	125	8	29	49	14
351 Industrial chemicals	7	346	2 580	51	173	82	9	11	61	20
352 Other chemical products	7	423	1 588	62	71	160	6	53	34	7
354/6 Rubber and plastic products	10	175	1 034	17	34	18	3	9	79	9
354 Products of petroleum and coal	1	1 000	1 100	5	40	8	.	3	94	3
355 Manufact./ repair of rubber prod.	1	240	633	68	21	38	10	20	35	35
356 Plastic products	8	64	1 094	28	29	29	7	19	62	13
36 Mineral products	13	149	749	19	37	21	10	27	54	10
361 Ceramics	3	182	409	18	15	15	9	31	49	11
362 Glass and glass prod.	3	196	859	30	56	22	7	33	50	10
369 Other mineral products	7	115	897	13	38	26	12	21	58	9
371 Iron, steel and ferroalloys	6	280	1 285	58	42	16	4	10	39	47
372 Non-ferrous metals	5	1 360	1 588	91	82	74	6	6	87	1
38 Fabr. machinery and equipment	106	186	870	55	34	81	11	25	48	16
- 50 employees	31	19	666	24	30	57	20	20	45	15
50 - 149 "	39	90	860	51	40	70	11	25	46	17
150 - "	36	434	881	56	33	84	11	26	48	16
No export	17	85	607	0	28	19	47	21	30	2
- 40 pct. export	41	152	721	16	36	35	9	29	49	12
40 - «	48	250	980	73	34	112	9	24	48	18
- 20 in innov-int	29	189	639	52	12	8	8	19	58	15
20 - 59 "	44	166	891	45	31	41	14	26	47	13
60 - "	33	210	1 031	64	55	182	10	28	43	19
381 Metal products	33	135	534	35	23	31	10	24	47	18
382 Machinery	24	284	880	57	45	80	7	31	48	15
383 Electrical apparatus and supplies	24	177	1 030	48	33	157	11	25	52	13
384 Transport equipment	22	185	1 051	68	30	56	18	20	43	19
385 Scientific instr. / optical goods	3	45	1 014	65	44	147	13	19	49	19
39 Other manufacturing industries	3	70	700	39	9	28	13	21	54	12

Innov-int is innovation costs per. person engaged in 1000 NOK

Table 9. Objectives for innovative activities: Measured by number of enterprises and innovation costs. Industry. 1992. Percentage

Industry/ Objectives	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
2,3 OIL EXTR., MINING AND MANUFACTURING								
Replace products being phased out	20	32	16	33	7	40	29	24
Improve product quality	7	6	14	73	2	11	9	78
Extend range within main product field	17	12	21	50	6	15	14	65
Extend range outside main product field	33	41	12	14	19	40	35	6
Increase or maintain market share	14	4	11	72	7	10	6	77
Create new domestic markets	22	20	17	41	15	22	35	28
Create new nordic markets	32	24	15	30	19	22	37	22
Create new markets in EU except Denmark	32	22	9	37	12	14	13	61
Create other new markets	36	27	10	28	18	17	9	57
Improve production flexibility	27	13	19	42	11	14	29	46
Reduce the share of wage costs	10	17	25	48	2	12	29	57
Cut the consumption of materials	11	20	24	46	2	13	25	59
Cut the energy consumption	16	37	22	25	7	34	10	49
Reduce the costs of product design	20	49	20	11	8	60	12	21
Reduce the production lead time	9	11	16	65	5	6	15	75
Reduce environmental damage	15	30	26	29	3	13	28	55
Improve working conditions	14	19	25	43	5	12	23	60
Other objectives of innovation	95	0	1	4	89	0	0	11
22 Crude petroleum/natural gas prod.								
Replace products being phased out	20	70	10	.	5	40	54	.
Improve product quality	10	10	20	60	3	18	4	75
Extend range within main product field	20	30	30	20	5	27	10	58
Extend range outside main product field	30	40	20	10	23	18	58	1
Increase or maintain market share	20	40	10	30	5	27	9	58
Create new domestic markets	30	10	30	30	8	18	67	7
Create new nordic markets	30	30	20	20	8	27	64	1
Create new markets in EU except Denmark	30	30	10	30	8	21	9	61
Create other new markets	40	20	10	30	12	18	9	61
Improve production flexibility	10	20	10	60	3	9	18	70
Reduce the share of wage costs	.	20	30	50	.	4	30	66
Cut the consumption of materials	.	30	10	60	.	19	3	79
Cut the energy consumption	.	30	.	70	.	19	.	81
Reduce the costs of product design	20	50	20	10	5	70	6	18
Reduce the production lead time	20	20	10	50	6	1	6	87
Reduce environmental damage	.	10	10	80	.	1	18	82
Improve working conditions	.	.	20	80	.	.	18	82
Other objectives of innovation	70	.	.	30	79	.	.	21
3 MANUFACTURING								
Replace products being phased out	20	30	16	34	7	41	15	37
Improve product quality	7	6	14	73	1	8	11	79
Extend range within main product field	17	12	21	50	7	8	17	68
Extend range outside main product field	33	41	12	14	16	52	23	9
Increase or maintain market share	14	3	10	72	8	1	5	87
Create new domestic markets	22	20	17	41	19	24	17	40
Create new nordic markets	31	24	14	30	24	18	22	35
Create new markets in EU except Denmark	32	22	9	37	15	11	15	60
Create other new markets	35	27	10	27	21	16	9	54
Improve production flexibility	27	13	19	41	15	17	35	32
Reduce the share of wage costs	10	17	25	48	4	17	28	51
Cut the consumption of materials	11	19	24	45	4	10	38	48
Cut the energy consumption	17	38	23	23	11	44	16	29
Reduce the costs of product design	20	48	20	11	8	54	15	23
Reduce the production lead time	8	10	16	65	3	8	21	68
Reduce environmental damage	15	31	27	27	5	21	34	40
Improve working conditions	15	19	25	42	7	18	26	48
Other objectives of innovation	96	0	1	4	95	0	0	5

Table 9(cont.). Objectives for innovative activities: Measured by number of enterprises and innovation costs. Industry. 1992. Percentage

Industry/ Objectives	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
31 Food, beverages and tobacco								
Replace products being phased out	22	36	21	21	13	35	21	31
Improve product quality	6	3	18	73	2	1	32	64
Extend range within main product field	15	19	27	39	4	16	31	48
Extend range outside main product field	34	46	7	12	39	53	2	6
Increase or maintain market share	16	6	12	66	20	2	3	75
Create new domestic markets	21	24	12	43	20	29	16	35
Create new nordic markets	48	27	3	22	56	12	1	31
Create new markets in EU except Denmark	46	25	3	25	54	18	3	25
Create other new markets	45	33	4	18	40	23	4	33
Improve production flexibility	25	15	21	39	14	17	32	37
Reduce the share of wage costs	10	12	28	49	15	19	11	55
Cut the consumption of materials	12	18	21	49	4	4	36	56
Cut the energy consumption	16	21	24	39	17	14	32	37
Reduce the costs of product design	27	48	21	4	21	53	22	4
Reduce the production lead time	15	18	21	46	18	19	31	32
Reduce environmental damage	15	25	25	34	3	18	31	48
Improve working conditions	13	15	22	49	18	16	23	43
Other objectives of innovation	99	.	.	1	100	.	.	0
32 Textiles, wearing apparel, leather								
Replace products being phased out	33	7	13	47	15	12	10	63
Improve product quality	13	7	.	80	4	8	.	88
Extend range within main product field	33	13	13	40	35	14	5	45
Extend range outside main product field	33	27	20	20	25	28	15	31
Increase or maintain market share	27	.	7	67	15	.	12	73
Create new domestic markets	27	7	13	53	21	12	9	58
Create new nordic markets	33	13	20	33	23	18	10	49
Create new markets in EU except Denmark	40	13	20	27	20	20	24	37
Create other new markets	40	27	20	13	28	49	10	12
Improve production flexibility	27	20	20	33	13	31	18	38
Reduce the share of wage costs	13	20	13	53	9	38	14	38
Cut the consumption of materials	20	13	13	53	4	31	14	51
Cut the energy consumption	27	53	13	7	13	65	21	1
Reduce the costs of product design	27	47	13	13	13	68	9	10
Reduce the production lead time	13	13	27	47	9	26	43	22
Reduce environmental damage	27	27	13	33	13	27	24	36
Improve working conditions	27	7	33	33	13	8	56	23
Other objectives of innovation	100	.	.	.	100	.	.	.
33 Wood								
Replace products being phased out	14	28	17	41	21	43	6	29
Improve product quality	3	10	7	79	1	7	6	85
Extend range within main product field	10	17	28	45	7	23	34	35
Extend range outside main product field	48	45	7	.	45	54	1	.
Increase or maintain market share	14	.	10	76	24	.	8	68
Create new domestic markets	17	14	17	52	29	7	9	55
Create new nordic markets	24	34	14	28	30	34	11	25
Create new markets in EU except Denmark	21	17	10	52	32	16	3	49
Create other new markets	38	31	7	24	45	29	16	10
Improve production flexibility	24	10	14	52	15	5	7	74
Reduce the share of wage costs	3	21	31	45	1	12	34	52
Cut the consumption of materials	3	17	17	62	1	14	20	65
Cut the energy consumption	10	38	31	21	32	20	10	38
Reduce the costs of product design	17	55	17	10	39	44	14	3
Reduce the production lead time	3	10	10	76	11	5	12	72
Reduce environmental damage	7	38	24	31	16	19	19	45
Improve working conditions	.	21	38	41	.	11	26	64
Other objectives of innovation	86	3	.	10	84	14	.	2

Table 9(cont.). Objectives for innovative activities: Measured by number of enterprises and innovation costs. Industry. 1992. Percentage

Industry/ Objectives	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
34 Paper, printing and publishing								
Replace products being phased out	31	41	5	22	24	45	1	30
Improve product quality	10	3	14	72	10	1	4	86
Extend range within main product field .	24	21	19	36	20	11	33	35
Extend range outside main product field	41	36	5	17	33	24	9	34
Increase or maintain market share	12	7	3	78	14	1	0	85
Create new domestic markets	24	24	19	33	22	16	24	38
Create new nordic markets	40	33	12	16	40	9	16	34
Create new markets in EU except Denmark	50	29	2	19	44	7	2	47
Create other new markets	52	36	5	7	41	39	5	15
Improve production flexibility	31	9	16	45	21	12	33	34
Reduce the share of wage costs	14	16	24	47	3	22	9	67
Cut the consumption of materials	12	26	29	33	3	11	37	49
Cut the energy consumption	26	45	10	19	17	30	35	17
Reduce the costs of product design	29	47	12	12	18	39	33	10
Reduce the production lead time	3	2	14	81	0	1	46	54
Reduce environmental damage	24	26	24	26	17	19	16	47
Improve working conditions	26	17	22	34	17	15	17	51
Other objectives of innovation	98	.	.	2	99	.	.	1
351/2 Chemicals								
Replace products being phased out	6	50	33	11	0	79	20	1
Improve product quality	.	6	11	83	.	0	10	90
Extend range within main product field .	6	11	11	72	1	19	3	78
Extend range outside main product field	11	50	33	6	1	65	33	1
Increase or maintain market share	.	.	11	89	.	.	7	93
Create new domestic markets	28	28	17	28	42	29	8	22
Create new nordic markets	22	28	6	44	42	30	0	29
Create new markets in EU except Denmark	.	22	11	67	.	14	1	85
Create other new markets	17	28	6	50	39	16	0	45
Improve production flexibility	6	39	28	28	0	50	18	32
Reduce the share of wage costs	.	33	33	33	.	10	65	26
Cut the consumption of materials	.	50	22	28	.	16	64	20
Cut the energy consumption	.	44	28	28	.	69	10	21
Reduce the costs of product design	6	83	6	6	0	95	3	2
Reduce the production lead time	6	28	22	44	0	15	17	68
Reduce environmental damage	6	22	22	50	1	6	52	40
Improve working conditions	17	28	28	28	7	7	54	32
354/6 Rubber and plastic products								
Replace products being phased out	9	36	.	55	6	41	.	52
Improve product quality	9	.	9	82	6	.	13	80
Extend range within main product field .	9	9	18	64	6	24	17	53
Extend range outside main product field	18	55	27	.	8	56	37	.
Increase or maintain market share	9	.	18	73	6	.	5	89
Create new domestic markets	9	18	27	45	6	5	46	43
Create new nordic markets	18	36	9	36	8	32	1	59
Create new markets in EU except Denmark	18	45	.	36	8	34	.	59
Create other new markets	9	55	.	36	6	47	.	47
Improve production flexibility	9	18	18	55	10	37	5	48
Reduce the share of wage costs	.	9	36	55	.	6	37	56
Cut the consumption of materials	9	.	27	64	6	.	26	68
Cut the energy consumption	.	27	18	55	.	41	12	47
Reduce the costs of product design	9	45	45	.	6	65	28	.
Reduce the production lead time	.	18	18	64	.	37	5	59
Reduce environmental damage	.	36	27	36	.	20	19	62
Improve working conditions	.	27	18	55	.	12	17	72
Other objectives of innovation	100	.	.	.	100	.	.	.
Other objectives of innovation	94	.	.	6	90	.	.	10

Table 9(cont.). Objectives for innovative activities: Measured by number of enterprises and innovation costs. Industry. 1992. Percentage

Industry/ Objectives	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
36 Mineral products								
Replace products being phased out	6	25	25	44	8	11	28	53
Improve product quality	.	.	13	88	.	.	2	98
Extend range within main product field	6	6	13	75	8	3	8	81
Extend range outside main product field	25	38	13	25	19	23	10	48
Increase or maintain market share	6	.	13	81	8	.	11	81
Create new domestic markets	19	13	13	56	13	11	10	66
Create new nordic markets	19	25	19	38	13	21	35	31
Create new markets in EU except Denmark	19	38	.	44	8	52	.	40
Create other new markets	19	38	6	38	8	30	24	38
Improve production flexibility	13	6	6	75	7	8	14	72
Reduce the share of wage costs	6	6	6	81	0	0	4	95
Cut the consumption of materials	6	19	19	56	0	16	15	69
Cut the energy consumption	6	13	31	50	0	9	24	67
Reduce the costs of product design	6	50	31	13	0	48	42	10
Reduce the production lead time	.	6	19	75	.	8	28	64
Reduce environmental damage	6	25	38	31	0	21	32	47
Improve working conditions	6	25	13	56	0	21	16	63
Other objectives of innovation	100	.	.	.	100	.	.	.
371 Iron, steel and ferroalloys								
Replace products being phased out	.	38	25	38	.	33	44	22
Improve product quality	.	.	.	100	.	.	.	100
Extend range within main product field	25	25	13	38	32	31	11	27
Extend range outside main product field	25	50	.	25	32	55	.	13
Increase or maintain market share	.	13	25	63	.	3	32	65
Create new domestic markets	25	63	13	.	32	66	3	.
Create new nordic markets	25	50	.	25	32	48	.	21
Create new markets in EU except Denmark	13	50	13	25	26	39	11	24
Create other new markets	25	50	13	13	32	39	18	11
Improve production flexibility	25	13	25	38	44	3	33	19
Reduce the share of wage costs	.	38	13	50	.	37	26	37
Cut the consumption of materials	.	38	13	50	.	28	11	62
Cut the energy consumption	.	25	25	50	.	6	17	77
Reduce the costs of product design	13	75	.	13	26	68	.	6
Reduce the production lead time	.	13	25	63	.	3	33	63
Reduce environmental damage	.	25	38	38	.	22	41	38
Improve working conditions	.	.	63	38	.	.	62	38
Other objectives of innovation	100	.	.	.	100	.	.	.
372 Non-ferrous metals								
Replace products being phased out	22	67	.	11	1	98	.	0
Improve product quality	.	.	33	67	.	.	14	86
Extend range within main product field	33	11	22	33	12	0	20	67
Extend range outside main product field	33	56	11	.	12	35	53	.
Increase or maintain market share	22	.	22	56	12	.	2	85
Create new domestic markets	22	44	11	22	1	45	1	53
Create new nordic markets	22	33	22	22	1	33	13	53
Create new markets in EU except Denmark	22	22	22	33	1	12	20	67
Create other new markets	22	44	.	33	1	32	.	67
Improve production flexibility	11	.	56	33	1	.	79	20
Reduce the share of wage costs	.	.	11	89	.	.	2	98
Cut the consumption of materials	.	.	22	78	.	.	0	100
Cut the energy consumption	.	11	22	67	.	1	2	97
Reduce the costs of product design	11	67	11	11	1	44	2	53
Reduce the production lead time	11	11	22	56	0	12	20	68
Reduce environmental damage	.	.	33	67	.	.	2	98
Improve working conditions	.	.	.	100	.	.	.	100
Other objectives of innovation	89	.	.	11	88	.	.	12

Table 9(cont.). Objectives for innovative activities: Measured by number of enterprises and innovation costs. Industry. 1992. Percentage

Industry/ Objectives	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
381 Metal products								
Replace products being phased out	19	23	21	37	13	9	10	68
Improve product quality	5	2	19	74	1	1	9	90
Extend range within main product field	9	2	30	58	2	0	62	36
Extend range outside main product field	33	37	19	12	19	68	9	4
Increase or maintain market share	14	2	12	72	3	3	3	91
Create new domestic markets	23	19	21	37	22	49	15	14
Create new nordic markets	21	21	26	33	5	8	61	27
Create new markets in EU except Denmark	30	14	16	40	16	5	9	70
Create other new markets	47	12	16	26	27	3	7	63
Improve production flexibility	37	5	19	40	20	1	13	65
Reduce the share of wage costs	14	23	26	37	2	11	59	27
Cut the consumption of materials	14	12	33	42	11	4	64	20
Cut the energy consumption	19	35	30	16	3	23	60	14
Reduce the costs of product design	21	42	26	12	12	20	14	53
Reduce the production lead time	14	7	9	70	12	4	3	81
Reduce environmental damage	14	28	35	23	3	15	23	59
Improve working conditions	9	9	35	47	2	9	19	70
Other objectives of innovation	88	.	2	9	98	.	0	1
382 Machinery								
Replace products being phased out	23	34	14	30	15	8	24	53
Improve product quality	11	7	18	64	1	38	9	52
Extend range within main product field	20	5	18	57	8	1	3	88
Extend range outside main product field	36	30	16	18	22	23	36	19
Increase or maintain market share	20	.	9	70	11	.	4	84
Create new domestic markets	27	11	16	45	16	4	51	29
Create new nordic markets	34	9	25	32	23	2	51	24
Create new markets in EU except Denmark	27	11	20	41	12	2	36	50
Create other new markets	25	16	18	41	9	3	2	87
Improve production flexibility	32	16	16	36	11	16	42	30
Reduce the share of wage costs	14	14	32	41	7	7	16	70
Cut the consumption of materials	16	25	20	39	9	4	8	79
Cut the energy consumption	20	45	23	11	10	55	17	18
Reduce the costs of product design	25	30	25	20	11	48	16	25
Reduce the production lead time	7	5	16	73	1	0	9	90
Reduce environmental damage	23	34	32	11	10	51	22	16
Improve working conditions	18	25	20	36	10	56	20	15
Other objectives of innovation	98	.	2	.	100	.	0	.
383 Electrical apparatus and supplies								
Replace products being phased out	7	11	22	59	0	3	14	82
Improve product quality	7	7	15	70	1	1	11	88
Extend range within main product field	11	4	11	74	4	0	4	91
Extend range outside main product field	30	26	19	26	6	77	9	8
Increase or maintain market share	7	.	7	85	0	.	3	96
Create new domestic markets	15	11	19	56	5	1	15	79
Create new nordic markets	19	7	15	59	7	1	38	54
Create new markets in EU except Denmark	30	11	7	52	9	3	29	59
Create other new markets	26	19	19	37	6	4	34	57
Improve production flexibility	33	19	19	30	48	8	35	9
Reduce the share of wage costs	11	19	26	44	5	46	35	14
Cut the consumption of materials	15	4	33	48	6	5	72	17
Cut the energy consumption	26	41	30	4	30	61	8	1
Reduce the costs of product design	15	37	30	19	5	26	28	41
Reduce the production lead time	15	11	11	63	4	4	30	62
Reduce environmental damage	15	41	30	15	2	26	69	2
Improve working conditions	22	30	15	33	6	17	30	47
Other objectives of innovation	93	.	.	7	94	.	.	6

Table 9(cont.). Objectives for innovative activities: Measured by number of enterprises and innovation costs. Industry. 1992. Percentage

Industry/ Objectives	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
384 Transport equipment								
Replace products being phased out	25	18	14	43	5	7	21	67
Improve product quality	7	18	7	68	0	16	1	82
Extend range within main product field	25	7	18	50	3	5	48	44
Extend range outside main product field	29	57	4	11	16	81	0	3
Increase or maintain market share	18	4	14	64	3	0	6	90
Create new domestic markets	21	25	14	39	18	70	2	10
Create new nordic markets	29	25	14	32	19	50	24	6
Create new markets in EU except Denmark	29	21	4	46	7	9	0	84
Create other new markets	21	18	11	50	4	5	8	83
Improve production flexibility	25	11	29	36	3	2	21	74
Reduce the share of wage costs	14	14	18	54	1	16	10	73
Cut the consumption of materials	11	25	29	36	1	56	23	20
Cut the energy consumption	14	68	14	4	1	91	8	0
Reduce the costs of product design	14	64	14	7	1	86	9	4
Reduce the production lead time	4	4	21	71	0	0	3	96
Reduce environmental damage	14	50	25	11	1	27	28	45
Improve working conditions	14	29	29	29	7	20	21	51
Other objectives of innovation	96	.	.	4	98	.	.	2
385 Scientific instr. / optical goods								
Replace products being phased out	20	.	20	60	2	.	1	98
Improve product quality	.	40	20	40	.	72	2	27
Extend range within main product field	20	.	20	60	2	.	13	85
Extend range outside main product field	20	40	.	40	2	84	.	14
Increase or maintain market share	.	20	.	80	.	13	.	87
Create new domestic markets	20	40	20	20	2	84	13	1
Create new nordic markets	20	20	.	60	2	71	.	27
Create new markets in EU except Denmark	20	20	.	60	2	71	.	27
Create other new markets	20	20	.	60	2	13	.	85
Improve production flexibility	60	20	20	.	16	13	71	.
Reduce the share of wage costs	20	40	20	20	2	14	71	13
Cut the consumption of materials	.	40	20	40	.	14	71	15
Cut the energy consumption	20	60	20	.	2	27	71	.
Reduce the costs of product design	.	40	20	40	.	14	13	73
Reduce the production lead time	.	40	.	60	.	14	.	86
Reduce environmental damage	20	60	.	20	2	85	.	13
Improve working conditions	20	60	.	20	2	85	.	13
Other objectives of innovation	100	.	.	.	100	.	.	.
39 Other manufacturing industries								
Replace products being phased out	29	14	.	57	8	0	.	92
Improve product quality	14	29	.	57	8	39	.	53
Extend range within main product field	14	14	29	43	8	47	1	45
Extend range outside main product field	29	57	14	.	8	92	0	.
Increase or maintain market share	29	.	14	57	55	.	6	40
Create new domestic markets	14	.	29	57	8	.	53	40
Create new nordic markets	43	14	29	14	16	1	47	37
Create new markets in EU except Denmark	43	14	29	14	16	1	37	47
Create other new markets	43	14	29	14	16	1	37	47
Improve production flexibility	43	.	.	57	60	.	.	40
Reduce the share of wage costs	14	29	14	43	8	37	47	8
Cut the consumption of materials	14	.	29	57	8	.	37	55
Cut the energy consumption	14	29	29	29	8	39	53	1
Reduce the costs of product design	14	43	29	14	8	9	84	0
Reduce the production lead time	.	14	.	86	.	37	.	63
Reduce environmental damage	29	29	.	43	55	37	.	8
Improve working conditions	14	14	14	57	8	37	1	55
Other objectives of innovation	100	.	.	.	100	.	.	.

Table 10. Objectives for innovative activities: Measured by number of enterprises and innovation costs. Employment class. 1992. Percentage

Employment class/ Objectives	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
Enterprises with less than 20 persons engaged								
Replace products being phased out	26	27	9	39	22	17	7	54
Improve product quality	9	5	16	71	8	2	15	75
Extend range within main product field	15	16	13	56	6	15	17	62
Extend range outside main product field	38	34	12	16	39	31	15	16
Increase or maintain market share	12	7	13	67	9	7	12	73
Create new domestic markets	21	16	16	48	19	19	19	43
Create new nordic markets	30	28	15	27	22	30	8	39
Create new markets in EU except Denmark	41	29	11	18	33	27	11	29
Create other new markets	46	35	6	12	40	37	4	20
Improve production flexibility	38	12	17	33	39	14	16	31
Reduce the share of wage costs	22	20	22	37	17	19	31	33
Cut the consumption of materials	21	22	22	35	19	26	26	29
Cut the energy consumption	27	41	15	17	25	43	16	16
Reduce the costs of product design	30	40	16	13	30	42	16	12
Reduce the production lead time	11	10	13	66	12	9	12	67
Reduce environmental damage	21	35	18	26	18	28	26	29
Improve working conditions	21	20	23	37	26	18	23	33
Other objectives of innovation	95	.	.	5	98	.	.	2
Enterprises with 20 - 49 persons engaged								
Replace products being phased out	15	27	24	33	20	31	24	25
Improve product quality	2	6	15	77	0	4	13	84
Extend range within main product field	15	9	29	47	8	20	32	39
Extend range outside main product field	35	45	11	9	33	52	9	6
Increase or maintain market share	17	2	11	71	20	0	10	70
Create new domestic markets	15	11	21	53	32	14	16	38
Create new nordic markets	35	24	9	32	46	17	11	27
Create new markets in EU except Denmark	35	27	5	33	45	20	4	32
Create other new markets	38	33	8	21	54	20	6	20
Improve production flexibility	30	8	17	45	22	4	11	63
Reduce the share of wage costs	8	12	30	50	2	7	39	52
Cut the consumption of materials	9	20	26	45	3	18	26	54
Cut the energy consumption	14	41	27	18	30	31	22	17
Reduce the costs of product design	18	58	14	11	36	40	10	13
Reduce the production lead time	6	8	6	80	13	5	8	74
Reduce environmental damage	17	29	33	21	16	20	25	39
Improve working conditions	12	14	33	41	3	7	28	62
Other objectives of innovation	95	.	2	3	98	.	0	2
Enterprises with 50 - 99 persons engaged								
Replace products being phased out	18	34	22	26	16	45	14	25
Improve product quality	7	5	18	70	1	1	39	59
Extend range within main product field	14	15	25	47	8	8	20	64
Extend range outside main product field	26	41	15	18	22	37	25	17
Increase or maintain market share	15	3	10	73	12	2	7	79
Create new domestic markets	21	21	26	33	22	30	15	33
Create new nordic markets	22	25	16	37	19	29	12	39
Create new markets in EU except Denmark	22	23	14	41	11	14	7	68
Create other new markets	27	29	10	34	16	20	4	61
Improve production flexibility	23	11	25	41	9	9	53	29
Reduce the share of wage costs	7	16	30	47	1	34	34	31
Cut the consumption of materials	10	21	27	42	6	13	53	29
Cut the energy consumption	14	48	22	16	4	70	16	10
Reduce the costs of product design	16	55	23	5	9	75	11	6
Reduce the production lead time	8	12	22	58	6	42	19	34
Reduce environmental damage	14	36	30	21	5	45	33	17
Improve working conditions	11	21	26	42	2	23	48	27
Other objectives of innovation	93	.	1	5	99	.	0	1

Table 10(cont.) Objectives for innovative activities: Measured by number of enterprises and innovation costs. Employment class. 1992. Percentage

Employment class/ Objectives	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
Enterprises with 100 - 199 persons engaged								
Replace products being phased out	26	25	10	40	16	25	17	42
Improve product quality	8	10	8	74	2	9	9	80
Extend range within main product field	26	10	15	49	13	5	14	68
Extend range outside main product field	41	40	11	8	40	39	17	4
Increase or maintain market share	15	3	8	74	9	1	9	80
Create new domestic markets	30	23	12	34	20	22	25	33
Create new nordic markets	41	21	12	26	43	16	21	20
Create new markets in EU except Denmark	37	10	10	44	37	7	12	44
Create other new markets	41	14	18	27	37	10	18	35
Improve production flexibility	21	16	15	48	16	25	20	38
Reduce the share of wage costs	10	26	19	45	15	21	31	33
Cut the consumption of materials	8	18	23	51	7	16	28	49
Cut the energy consumption	15	27	30	27	18	33	27	22
Reduce the costs of product design	21	44	23	12	20	48	24	8
Reduce the production lead time	10	12	18	60	15	7	18	60
Reduce environmental damage	14	37	25	25	5	45	31	20
Improve working conditions	15	26	25	34	9	44	19	28
Other objectives of innovation	97	1	.	1	95	4	.	1
Enterprises with at least 200 persons engaged								
Replace products being phased out	15	37	18	30	4	44	14	38
Improve product quality	8	5	12	75	1	9	8	82
Extend range within main product field	15	10	23	52	6	8	16	70
Extend range outside main product field	27	44	12	16	11	57	24	9
Increase or maintain market share	12	1	10	77	7	0	3	90
Create new domestic markets	22	29	10	40	18	25	16	42
Create new nordic markets	30	23	18	30	21	17	24	37
Create new markets in EU except Denmark	27	20	7	46	10	10	17	64
Create other new markets	25	25	10	40	17	16	8	59
Improve production flexibility	24	16	22	37	15	18	37	30
Reduce the share of wage costs	5	12	24	58	2	14	27	57
Cut the consumption of materials	7	18	24	52	2	8	38	51
Cut the energy consumption	13	32	21	34	9	43	14	34
Reduce the costs of product design	15	47	23	14	5	53	14	28
Reduce the production lead time	5	10	20	65	1	5	22	73
Reduce environmental damage	12	19	29	41	4	14	35	47
Improve working conditions	13	16	19	52	8	14	25	53
Other objectives of innovation	97	.	.	3	94	.	.	6

Table 11. Objectives for innovative activities: Measured by number of enterprises and innovation costs. Export share-class. 1992. Percentage

Export share-class/ Objectives	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
Enterprises without export								
Replace products being phased out	27	38	9	27	30	42	7	21
Improve product quality	11	6	14	69	14	5	11	70
Extend range within main product field	20	21	19	40	19	29	23	28
Extend range outside main product field	40	35	14	11	44	41	11	5
Increase or maintain market share	19	6	10	65	24	4	7	66
Create new domestic markets	20	23	15	42	20	35	9	35
Create new nordic markets	44	36	7	12	66	27	1	6
Create new markets in EU except Denmark	52	36	6	6	69	24	2	5
Create other new markets	52	39	6	4	59	24	10	7
Improve production flexibility	35	10	17	38	37	13	16	34
Reduce the share of wage costs	15	11	25	49	10	8	18	64
Cut the consumption of materials	18	26	24	32	14	20	35	30
Cut the energy consumption	27	39	17	18	30	36	18	17
Reduce the costs of product design	31	41	17	11	34	42	15	9
Reduce the production lead time	11	6	11	71	9	2	12	76
Reduce environmental damage	24	31	22	23	29	24	21	26
Improve working conditions	22	14	23	42	28	15	10	47
Other objectives of innovation	94	.	1	6	98	.	0	2
Enterprises with less than 20 per cent export								
Replace products being phased out	18	25	22	35	20	29	25	27
Improve product quality	6	5	11	77	1	1	27	71
Extend range within main product field	12	8	26	55	9	3	27	61
Extend range outside main product field	31	40	15	14	44	28	11	17
Increase or maintain market share	11	1	12	76	16	1	7	76
Create new domestic markets	23	9	18	51	36	12	25	27
Create new nordic markets	25	19	20	35	44	10	9	38
Create new markets in EU except Denmark	33	26	14	27	48	21	5	26
Create other new markets	34	31	16	18	40	31	7	22
Improve production flexibility	31	11	17	41	23	15	30	31
Reduce the share of wage costs	11	20	26	43	21	12	12	56
Cut the consumption of materials	10	18	22	51	15	9	19	57
Cut the energy consumption	15	35	24	26	24	19	28	29
Reduce the costs of product design	16	44	27	13	28	29	36	7
Reduce the production lead time	8	8	22	63	20	5	35	40
Reduce environmental damage	12	30	33	25	11	15	30	44
Improve working conditions	11	17	25	47	23	20	16	41
Other objectives of innovation	99	.	.	1	100	.	.	0
Enterprises with 20 - 39 per cent export								
Replace products being phased out	15	28	23	34	4	12	53	30
Improve product quality	2	2	17	79	0	2	12	86
Extend range within main product field	15	11	19	55	4	5	15	76
Extend range outside main product field	21	55	4	19	10	78	1	11
Increase or maintain market share	6	2	13	79	4	0	17	78
Create new domestic markets	11	17	19	53	1	8	15	76
Create new nordic markets	17	13	13	57	2	11	7	80
Create new markets in EU except Denmark	17	13	11	60	2	28	4	66
Create other new markets	30	21	17	32	8	23	11	59
Improve production flexibility	19	17	13	51	4	17	4	75
Reduce the share of wage costs	9	28	19	45	1	20	50	29
Cut the consumption of materials	4	19	23	53	0	16	17	67
Cut the energy consumption	13	47	21	19	3	57	11	30
Reduce the costs of product design	15	66	19	.	4	74	22	.
Reduce the production lead time	4	13	19	64	1	9	39	51
Reduce environmental damage	13	34	26	28	3	22	34	41
Improve working conditions	9	26	36	30	1	8	35	55
Other objectives of innovation	91	2	2	4	66	5	0	29

Table 11(cont.). Objectives for innovative activities: Measured by number of enterprises and innovation costs. Export share-class. 1992. Percentage

Export share-class/ Objectives	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
Enterprises with 40 - 79 per cent export								
Replace products being phased out	13	21	16	50	1	25	9	64
Improve product quality	3	13	10	74	0	26	1	73
Extend range within main product field .	11	6	18	65	2	15	15	68
Extend range outside main product field	31	40	13	16	6	49	38	7
Increase or maintain market share	11	2	13	74	1	0	3	95
Create new domestic markets	19	26	16	39	5	26	24	45
Create new nordic markets	24	21	13	42	8	17	33	42
Create new markets in EU except Denmark	16	6	6	71	5	2	21	72
Create other new markets	19	13	6	61	5	9	3	84
Improve production flexibility	26	16	23	35	28	8	35	28
Reduce the share of wage costs	5	13	31	52	1	33	18	48
Cut the consumption of materials	6	10	32	52	1	3	57	38
Cut the energy consumption	10	34	40	16	3	54	25	17
Reduce the costs of product design	10	52	24	15	3	55	9	33
Reduce the production lead time	3	15	15	68	0	5	8	88
Reduce environmental damage	10	29	26	35	2	31	33	34
Improve working conditions	11	24	16	48	6	28	7	59
Other objectives of innovation	97	.	.	3	99	.	.	1
Enterprises with at least 80 per cent export								
Replace products being phased out	20	36	17	27	4	61	8	27
Improve product quality	5	3	20	71	0	0	13	86
Extend range within main product field .	25	7	20	47	8	2	14	77
Extend range outside main product field	36	42	10	12	11	58	24	8
Increase or maintain market share	17	2	5	76	7	0	2	91
Create new domestic markets	36	31	15	19	27	28	12	33
Create new nordic markets	34	19	22	25	27	22	26	25
Create new markets in EU except Denmark	19	8	10	63	3	6	18	72
Create other new markets	24	17	8	51	21	14	12	52
Improve production flexibility	14	15	29	42	3	25	48	24
Reduce the share of wage costs	8	20	22	49	0	8	37	55
Cut the consumption of materials	8	19	22	51	1	12	36	52
Cut the energy consumption	8	36	15	41	10	42	8	40
Reduce the costs of product design	20	53	12	15	2	59	11	28
Reduce the production lead time	10	17	17	56	0	13	22	65
Reduce environmental damage	10	31	29	31	0	15	38	46
Improve working conditions	14	24	29	34	1	14	43	41
Other objectives of innovation	97	.	.	3	96	.	.	4

Table 12. Objectives for innovative activities: Measured by number of enterprises and innovation costs. Innovation costs share-class. 1992. Percentage

Innovation costs share-class/ Objectives	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
Enterprises with less than 10 000 NOK innovation costs per person engaged								
Replace products being phased out	30	39	11	20	19	49	10	22
Improve product quality	19	10	9	63	12	18	9	61
Extend range within main product field	30	7	20	43	14	21	23	42
Extend range outside main product field	37	36	11	16	22	40	11	26
Increase or maintain market share	16	3	13	69	14	5	12	69
Create new domestic markets	27	19	16	39	14	38	17	31
Create new nordic markets	34	23	19	24	20	39	13	28
Create new markets in EU except Denmark	40	21	10	29	21	29	10	40
Create other new markets	39	26	13	23	23	37	9	31
Improve production flexibility	26	17	17	40	15	34	7	44
Reduce the share of wage costs	17	11	23	49	8	5	37	50
Cut the consumption of materials	14	27	16	43	4	35	16	45
Cut the energy consumption	26	33	16	26	12	39	20	29
Reduce the costs of product design	29	39	21	11	17	49	23	11
Reduce the production lead time	13	13	11	63	5	18	8	69
Reduce environmental damage	26	31	23	20	12	18	41	28
Improve working conditions	23	19	24	34	7	15	27	52
Other objectives of innovation	94	.	3	3	97	.	1	1
Enterprises with 10 000 - 19 000 NOK innovation costs per person engaged								
Replace products being phased out	25	26	18	32	22	33	11	34
Improve product quality	7	7	14	72	7	3	14	76
Extend range within main product field	21	18	23	39	27	20	27	26
Extend range outside main product field	33	42	9	16	44	47	3	7
Increase or maintain market share	19	4	9	68	21	1	4	74
Create new domestic markets	21	23	11	46	27	26	5	42
Create new nordic markets	30	35	5	30	41	18	2	39
Create new markets in EU except Denmark	30	26	4	40	40	10	1	49
Create other new markets	39	30	5	26	39	12	6	42
Improve production flexibility	35	12	14	39	36	24	5	35
Reduce the share of wage costs	9	28	14	49	9	15	8	67
Cut the consumption of materials	14	21	21	44	13	12	24	51
Cut the energy consumption	16	33	21	30	14	28	19	39
Reduce the costs of product design	23	60	14	4	23	62	6	8
Reduce the production lead time	9	7	19	65	4	3	30	63
Reduce environmental damage	14	33	30	23	15	25	39	21
Improve working conditions	14	14	30	42	15	19	35	32
Other objectives of innovation	93	.	.	7	99	.	.	1
Enterprises with 20 000 - 39 000 NOK innovation costs per person engaged								
Replace products being phased out	16	34	11	38	16	33	19	32
Improve product quality	3	7	15	75	2	2	28	67
Extend range within main product field	17	16	22	45	15	14	27	43
Extend range outside main product field	34	37	14	15	35	46	8	11
Increase or maintain market share	13	6	9	72	18	2	4	77
Create new domestic markets	25	18	16	40	36	20	18	25
Create new nordic markets	37	23	11	29	48	15	12	25
Create new markets in EU except Denmark	34	26	9	30	45	25	3	26
Create other new markets	33	31	13	23	31	24	12	32
Improve production flexibility	28	11	16	45	23	14	22	41
Reduce the share of wage costs	10	10	23	56	14	10	10	67
Cut the consumption of materials	8	20	18	54	12	11	15	63
Cut the energy consumption	11	38	25	25	15	27	24	34
Reduce the costs of product design	15	47	25	13	16	46	29	9
Reduce the production lead time	5	8	18	69	5	5	33	58
Reduce environmental damage	17	28	25	30	16	18	17	49
Improve working conditions	11	21	21	47	30	17	7	47
Other objectives of innovation	98	.	.	2	99	.	.	1

Table 12(cont.). Objectives for innovative activities: Measured by number of enterprises and innovation costs. Innovation costs share-class. 1992. Percentage

Innovation costs share-class/ Objectives	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
Enterprises with 40 000 - 59 000 NOK innovation costs per person engaged								
Replace products being phased out	20	25	27	29	14	25	40	21
Improve product quality	5	2	11	82	5	2	4	89
Extend range within main product field	18	11	23	48	16	9	16	59
Extend range outside main product field	30	48	13	9	26	61	3	10
Increase or maintain market share	20	.	14	66	15	.	9	76
Create new domestic markets	23	16	18	43	18	12	7	63
Create new nordic markets	36	13	18	34	27	9	13	51
Create new markets in EU except Denmark	36	16	14	34	25	9	7	59
Create other new markets	38	23	13	27	23	30	7	40
Improve production flexibility	21	11	23	45	16	18	34	32
Reduce the share of wage costs	7	14	39	39	1	20	32	47
Cut the consumption of materials	11	14	34	41	6	6	24	64
Cut the energy consumption	16	30	34	20	13	14	35	38
Reduce the costs of product design	18	39	32	11	17	32	36	15
Reduce the production lead time	7	9	18	66	2	5	17	77
Reduce environmental damage	18	30	29	23	13	17	38	31
Improve working conditions	20	20	20	41	25	22	12	41
Other objectives of innovation	98	.	.	2	99	.	.	1
Enterprises with 60 000 - 99 000 NOK innovation costs per person engaged								
Replace products being phased out	8	33	15	44	2	72	9	18
Improve product quality	.	2	25	73	.	0	19	81
Extend range within main product field	6	12	19	63	10	2	24	65
Extend range outside main product field	33	52	6	10	20	37	42	2
Increase or maintain market share	10	4	8	79	11	1	9	79
Create new domestic markets	12	21	19	48	6	29	9	57
Create new nordic markets	19	31	17	33	11	30	3	56
Create new markets in EU except Denmark	27	21	10	42	8	13	16	63
Create other new markets	33	31	12	25	8	34	4	54
Improve production flexibility	33	8	19	40	9	6	51	34
Reduce the share of wage costs	4	23	15	58	0	7	10	83
Cut the consumption of materials	4	17	23	56	0	14	6	80
Cut the energy consumption	10	46	23	21	1	23	6	69
Reduce the costs of product design	12	58	13	17	1	52	4	43
Reduce the production lead time	4	13	13	69	0	5	23	72
Reduce environmental damage	8	31	27	35	1	17	10	72
Improve working conditions	8	21	25	46	1	11	16	72
Other objectives of innovation	96	.	.	4	95	.	.	5
Enterprises with at least 100 000 NOK innovation costs per person engaged								
Replace products being phased out	21	22	17	40	5	35	12	49
Improve product quality	5	8	11	76	0	13	7	80
Extend range within main product field	6	8	17	68	1	8	11	80
Extend range outside main product field	30	35	19	16	8	58	24	10
Increase or maintain market share	8	2	10	81	2	0	2	95
Create new domestic markets	19	25	21	35	20	25	22	33
Create new nordic markets	29	22	16	33	23	16	34	27
Create new markets in EU except Denmark	25	17	8	49	7	6	19	68
Create other new markets	32	22	5	41	21	6	10	63
Improve production flexibility	22	17	27	33	14	21	36	29
Reduce the share of wage costs	13	21	35	32	3	21	38	37
Cut the consumption of materials	14	16	38	32	2	9	57	32
Cut the energy consumption	21	46	17	16	12	61	14	13
Reduce the costs of product design	25	51	11	13	6	60	12	21
Reduce the production lead time	11	13	16	60	5	11	18	67
Reduce environmental damage	6	32	29	33	1	23	44	32
Improve working conditions	11	21	30	38	1	21	36	42
Other objectives of innovation	94	2	.	5	92	1	.	7

Table 13. Sources of innovative ideas: Measured by number of enterprises and innovation costs. Industry. 1992. Percentage

Industry/ Sources of innovative ideas	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
2,3 OIL EXTR., MINING AND MANUFACTURING								
Internal sources: In the enterprise ..	7	14	26	53	2	6	16	77
..... concern	43	21	13	24	14	17	17	52
Commercial: Contractors; Components .	12	20	28	41	4	28	40	28
..... Equipment ..	9	18	31	42	3	27	46	23
..... Customers or clients	11	14	16	59	4	18	18	60
..... Competitors	14	29	28	30	4	14	35	47
..... Consultants	15	56	19	10	5	30	28	37
Universities	16	48	23	13	4	22	35	39
Governmental research institutes	17	46	23	15	5	18	32	45
Business organisations research inst. .	14	41	28	18	11	32	27	30
Patents documents	20	63	12	6	6	46	17	31
Commercial conferences, literature etc.	9	20	36	35	3	8	31	59
Fairs or exhibitions	7	22	35	36	2	19	55	24
Other sources of innovative ideas	98	.	1	2	92	.	1	8
22 Crude petroleum/natural gas prod.								
Internal sources: In the enterprise ..	.	10	20	70	.	1	2	97
..... concern	10	.	30	60	18	.	3	79
Commercial: Contractors; Components .	10	10	30	50	2	18	61	19
..... Equipment ..	10	20	20	50	2	21	55	23
..... Customers or clients	20	30	10	40	5	21	9	65
..... Competitors	10	20	40	30	2	4	19	76
..... Consultants	20	40	20	20	5	10	13	72
Universities	.	20	20	60	.	3	24	73
Governmental research institutes	10	10	30	50	3	0	27	70
Business organisations research inst. .	30	20	20	30	23	6	12	58
Patents documents	10	60	20	10	2	22	21	54
Commercial conferences, literature etc.	10	10	60	20	2	3	37	58
Fairs or exhibitions	10	40	50	.	2	15	82	.
Other sources of innovative ideas	80	.	.	20	79	.	.	21
3 MANUFACTURING								
Internal sources: In the enterprise ..	8	14	26	52	3	9	24	65
..... concern	43	21	13	23	12	27	25	36
Commercial: Contractors; Components .	12	19	28	41	4	33	29	33
..... Equipment ..	9	18	31	42	4	31	41	23
..... Customers or clients	11	13	16	59	3	16	23	58
..... Competitors	14	29	27	30	6	19	44	31
..... Consultants	15	56	19	10	5	41	37	16
Universities	16	49	23	12	6	33	42	19
Governmental research institutes	17	47	23	14	7	28	34	31
Business organisations research inst. .	14	41	28	17	5	46	35	14
Patents documents	21	62	11	6	9	59	15	17
Commercial conferences, literature etc.	9	20	36	35	3	11	28	59
Fairs or exhibitions	7	21	35	37	3	20	40	37
Other sources of innovative ideas	98	.	1	1	99	.	1	0

Table 13(cont.). Sources of innovative ideas: Measured by number of enterprises and innovation costs. Industry. 1992. Percentage

Industry/ Sources of innovative ideas	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
31 Food, beverages and tobacco								
Internal sources: In the enterprise ..	7	12	30	51	1	12	14	72
..... concern	51	15	6	28	42	9	12	37
Commercial: Contractors; Components .	13	7	31	48	13	19	20	49
..... Equipment ..	7	7	34	51	13	3	33	51
..... Customers or clients	12	21	22	45	2	27	26	45
..... Competitors	15	31	27	27	7	38	24	31
..... Consultants	15	57	16	12	14	44	32	10
Universities	15	51	19	15	19	44	15	22
Governmental research institutes	18	48	21	13	21	44	16	19
Business organisations research inst. .	12	30	31	27	10	13	44	33
Patents documents	24	63	10	3	27	36	31	6
Commercial conferences, literature etc.	7	24	27	42	2	8	28	63
Fairs or exhibitions	9	25	36	30	12	13	40	35
Other sources of innovative ideas	99	.	.	1	100	.	.	0
32 Textiles, wearing apparel, leather								
Internal sources: In the enterprise ..	13	7	27	53	15	0	27	58
..... concern	67	27	.	7	56	36	.	8
Commercial: Contractors; Components .	33	7	7	53	14	14	8	65
..... Equipment ..	20	20	13	47	8	30	11	51
..... Customers or clients	27	7	7	60	13	22	6	59
..... Competitors	20	20	20	40	8	44	18	29
..... Consultants	33	60	7	.	14	81	6	.
Universities	33	47	13	7	14	59	26	1
Governmental research institutes	27	40	20	13	6	47	18	30
Business organisations research inst. .	27	20	40	13	13	16	58	13
Patents documents	40	60	.	.	22	78	.	.
Commercial conferences, literature etc.	20	13	33	33	16	2	37	46
Fairs or exhibitions	20	7	27	47	16	0	23	61
Other sources of innovative ideas	100	.	.	.	100	.	.	.
33 Wood								
Internal sources: In the enterprise ..	10	14	28	48	15	6	38	42
..... concern	52	28	21	.	54	37	10	.
Commercial: Contractors; Components .	7	24	34	34	12	18	26	43
..... Equipment ..	.	24	48	28	.	10	54	36
..... Customers or clients	10	21	21	48	18	45	25	12
..... Competitors	7	45	28	21	12	32	40	16
..... Consultants	7	62	17	14	17	58	4	21
Universities	17	62	17	3	34	47	8	11
Governmental research institutes	14	55	21	10	18	48	6	27
Business organisations research inst. .	7	45	24	24	12	24	20	43
Patents documents	14	69	10	7	34	63	2	1
Commercial conferences, literature etc.	7	28	48	17	12	17	46	25
Fairs or exhibitions	.	34	21	45	.	18	29	53
Other sources of innovative ideas	100	.	.	.	100	.	.	.

Table 13(cont.). Sources of innovative ideas: Measured by number of enterprises and innovation costs. Industry. 1992. Percentage

Industry/ Sources of innovative ideas	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
34 Paper, printing and publishing								
Internal sources: In the enterprise ..	10	19	16	55	3	17	7	73
..... concern	48	24	17	10	27	37	8	28
Commercial: Contractors; Components .	21	14	26	40	18	4	14	64
..... Equipment ..	12	5	17	66	11	1	22	65
..... Customers or clients	22	26	7	45	17	10	8	64
..... Competitors	21	29	22	28	17	28	35	19
..... Consultants	21	43	26	10	17	37	31	15
Universities	26	48	19	7	18	25	53	4
Governmental research institutes	24	52	19	5	18	43	33	6
Business organisations research inst. .	19	34	28	19	16	43	14	27
Patents documents	31	67	.	2	31	51	.	19
Commercial conferences, literature etc.	9	9	33	50	9	2	45	43
Fairs or exhibitions	5	9	38	48	9	2	36	53
Other sources of innovative ideas	97	.	2	2	88	.	11	0
351/2 Chemicals								
Internal sources: In the enterprise ..	6	17	28	50	0	12	13	75
..... concern	6	17	33	44	1	4	20	75
Commercial: Contractors; Components .	6	56	22	17	0	61	26	13
..... Equipment ..	6	44	33	17	5	56	35	4
..... Customers or clients	.	17	17	67	.	10	24	66
..... Competitors	17	28	39	17	6	14	39	42
..... Consultants	11	61	22	6	1	47	49	4
Universities	6	39	22	33	1	45	34	20
Governmental research institutes	11	39	22	28	1	46	33	20
Business organisations research inst. .	11	50	17	22	5	70	11	14
Patents documents	11	33	22	33	1	35	13	52
Commercial conferences, literature etc.	6	17	17	61	0	3	9	88
Fairs or exhibitions	6	33	39	22	0	40	54	7
Other sources of innovative ideas	100	.	.	.	100	.	.	.
354/6 Rubber and plastic products								
Internal sources: In the enterprise ..	.	18	36	45	.	12	47	40
..... concern	27	27	27	18	4	32	53	11
Commercial: Contractors; Components .	.	.	27	73	.	.	16	84
..... Equipment ..	.	9	36	55	.	24	45	32
..... Customers or clients	.	.	18	82	.	.	10	90
..... Competitors	9	55	9	27	6	83	4	7
..... Consultants	9	73	9	9	6	91	1	1
Universities	9	64	18	9	6	82	2	9
Governmental research institutes	9	55	27	9	6	51	41	1
Business organisations research inst. .	9	55	27	9	6	68	25	1
Patents documents	9	82	9	.	6	92	1	.
Commercial conferences, literature etc.	9	18	36	36	6	8	65	21
Fairs or exhibitions	.	36	45	18	.	38	50	11
Other sources of innovative ideas	100	.	.	.	100	.	.	.

Table 13(cont.). Sources of innovative ideas: Measured by number of enterprises and innovation costs. Industry. 1992. Percentage

Industry/ Sources of innovative ideas	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
36 Mineral products								
Internal sources: In the enterprise ..	6	13	31	50	0	2	26	72
..... concern	25	25	13	38	26	24	8	42
Commercial: Contractors; Components .	6	13	38	44	0	9	46	45
..... Equipment ..	6	6	56	31	0	2	51	47
..... Customers or clients	13	6	25	56	8	8	13	71
..... Competitors	13	31	31	25	8	31	42	20
..... Consultants	13	56	25	6	8	51	17	24
Universities	13	38	38	13	8	25	40	26
Governmental research institutes	13	31	38	19	8	23	38	31
Business organisations research inst. .	13	31	38	19	8	29	54	9
Patents documents	13	81	6	.	8	90	2	.
Commercial conferences, literature etc.	13	19	56	13	8	5	77	10
Fairs or exhibitions	6	31	56	6	0	39	59	2
Other sources of innovative ideas	100	.	.	.	100	.	.	.
371 Iron, steel and ferroalloys								
Internal sources: In the enterprise ..	.	13	38	50	.	27	40	33
..... concern	13	75	.	13	6	88	.	6
Commercial: Contractors; Components .	.	38	38	25	.	20	56	24
..... Equipment ..	.	38	38	25	.	28	56	16
..... Customers or clients	.	25	.	75	.	31	.	69
..... Competitors	.	50	13	38	.	52	6	42
..... Consultants	.	75	13	13	.	76	6	18
Universities	.	50	13	38	.	52	11	38
Governmental research institutes	.	38	38	25	.	48	20	32
Business organisations research inst. .	.	25	50	25	.	31	61	8
Patents documents	25	63	13	.	32	62	6	.
Commercial conferences, literature etc.	.	38	25	38	.	33	24	43
Fairs or exhibitions	.	50	13	38	.	67	3	30
Other sources of innovative ideas	100	.	.	.	100	.	.	.
372 Non-ferrous metals								
Internal sources: In the enterprise ..	.	33	22	44	.	2	32	66
..... concern	11	33	.	56	1	74	.	24
Commercial: Contractors; Components .	11	56	22	11	1	74	23	2
..... Equipment ..	.	33	44	22	.	73	24	3
..... Customers or clients	11	33	22	33	1	54	23	22
..... Competitors	.	33	56	11	.	13	86	1
..... Consultants	11	56	33	.	1	33	66	.
Universities	.	22	56	22	.	1	45	55
Governmental research institutes	11	44	22	22	1	12	32	55
Business organisations research inst. .	11	56	33	.	1	77	22	.
Patents documents	11	67	22	.	1	77	21	.
Commercial conferences, literature etc.	.	11	56	33	.	1	33	66
Fairs or exhibitions	11	44	33	11	1	32	66	0
Other sources of innovative ideas	100	.	.	.	100	.	.	.

Table 13(cont.). Sources of innovative ideas: Measured by number of enterprises and innovation costs. Industry. 1992. Percentage

Industry/ Sources of innovative ideas	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
381 Metal products								
Internal sources: In the enterprise ..	2	14	30	53	1	13	10	77
..... concern	58	9	14	19	17	14	12	58
Commercial: Contractors; Components .	12	35	21	33	2	24	9	64
..... Equipment ..	9	28	26	37	2	18	18	63
..... Customers or clients	9	7	7	77	2	2	10	85
..... Competitors	14	21	16	49	2	8	4	86
..... Consultants	19	58	9	14	12	27	52	10
Universities	19	58	16	7	3	33	58	6
Governmental research institutes	19	51	26	5	3	27	65	5
Business organisations research inst. .	19	51	21	9	3	27	62	7
Patents documents	21	53	16	9	12	22	56	10
Commercial conferences, literature etc.	9	28	40	23	1	10	72	16
Fairs or exhibitions	9	14	37	40	1	6	25	68
Other sources of innovative ideas	93	.	5	2	98	.	1	1
382 Machinery								
Internal sources: In the enterprise ..	11	14	32	43	6	9	21	65
..... concern	39	11	9	41	13	4	36	48
Commercial: Contractors; Components .	16	16	25	43	7	4	29	60
..... Equipment ..	14	25	20	41	1	45	36	18
..... Customers or clients	7	.	20	73	0	.	16	84
..... Competitors	11	27	32	30	7	15	10	69
..... Consultants	18	61	16	5	7	64	11	18
Universities	18	41	27	14	10	49	30	12
Governmental research institutes	18	39	18	25	10	13	22	55
Business organisations research inst. .	14	48	30	9	1	60	28	10
Patents documents	18	57	16	9	7	60	7	26
Commercial conferences, literature etc.	14	20	45	20	7	37	40	16
Fairs or exhibitions	7	25	34	34	1	17	46	37
Other sources of innovative ideas	98	.	.	2	100	.	.	0
383 Electrical apparatus and supplies								
Internal sources: In the enterprise ..	7	4	15	74	3	0	48	48
..... concern	22	33	15	30	2	25	69	4
Commercial: Contractors; Components .	.	11	37	52	.	25	60	15
..... Equipment ..	7	22	37	33	3	2	84	11
..... Customers or clients	7	7	30	56	5	6	47	42
..... Competitors	19	7	41	33	5	3	84	8
..... Consultants	7	48	30	15	2	15	29	54
Universities	7	37	37	19	0	17	72	10
Governmental research institutes	15	26	30	30	5	5	53	36
Business organisations research inst. .	15	41	22	22	4	17	66	13
Patents documents	11	56	26	7	0	82	16	2
Commercial conferences, literature etc.	7	11	26	56	2	1	7	90
Fairs or exhibitions	4	22	19	56	2	6	6	85
Other sources of innovative ideas	100	.	.	.	100	.	.	.

Table 13(cont.). Sources of innovative ideas: Measured by number of enterprises and innovation costs. Industry. 1992. Percentage

Industry/ Sources of innovative ideas	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
384 Transport equipment								
Internal sources: In the enterprise ..	7	25	18	50	1	21	5	74
..... concern	54	29	11	7	6	71	7	17
Commercial: Contractors; Components .	7	25	32	36	0	32	12	56
..... Equipment ..	11	14	43	32	0	5	40	54
..... Customers or clients	7	4	11	79	0	1	1	98
..... Competitors	7	32	29	32	0	51	36	13
..... Consultants	11	54	25	11	0	28	68	4
Universities	14	61	25	.	1	30	69	.
Governmental research institutes	11	75	11	4	0	43	56	0
Business organisations research inst. .	11	61	25	4	0	32	67	0
Patents documents	14	75	7	4	1	89	7	3
Commercial conferences, literature etc.	7	25	39	29	0	21	26	53
Fairs or exhibitions	7	11	39	43	0	5	39	56
Other sources of innovative ideas	100	.	.	.	100	.	.	.
385 Scientific instr. / optical goods								
Internal sources: In the enterprise ..	.	.	20	80	.	.	13	87
..... concern	40	20	20	20	2	13	71	13
Commercial: Contractors; Components .	.	40	40	20	.	72	15	13
..... Equipment ..	20	60	20	.	2	85	13	.
..... Customers or clients	.	.	40	60	.	.	14	86
..... Competitors	20	20	20	40	2	13	1	84
..... Consultants	20	40	40	.	2	84	14	.
Universities	20	40	20	20	2	84	13	1
Governmental research institutes	20	20	40	20	2	71	27	1
Business organisations research inst. .	20	40	20	20	2	84	1	13
Patents documents	20	60	20	.	2	85	13	.
Commercial conferences, literature etc.	.	40	60	.	.	84	16	.
Fairs or exhibitions	.	.	80	20	.	.	87	13
Other sources of innovative ideas	100	.	.	.	100	.	.	.
39 Other manufacturing industries								
Internal sources: In the enterprise ..	14	.	43	43	37	.	48	16
..... concern	71	.	.	29	47	.	.	53
Commercial: Contractors; Components .	14	.	14	71	8	.	6	86
..... Equipment ..	14	.	14	71	8	.	6	86
..... Customers or clients	14	.	14	71	8	.	47	45
..... Competitors	14	29	29	29	8	6	84	3
..... Consultants	14	86	.	.	8	92	.	.
Universities	14	43	43	.	8	9	84	.
Governmental research institutes	14	43	43	.	8	9	84	.
Business organisations research inst. .	14	43	43	.	8	9	84	.
Patents documents	29	57	14	.	44	9	47	.
Commercial conferences, literature etc.	29	29	14	29	44	1	2	53
Fairs or exhibitions	14	.	29	57	37	.	1	63
Other sources of innovative ideas	100	.	.	.	100	.	.	.

Table 14. Sources of innovative ideas: Measured by number of enterprises and innovation costs. Employment class. 1992. Percentage

Employment class/ Sources of innovative ideas	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
Enterprises with less than 20 persons engaged								
Internal sources: In the enterprise ..	20	13	23	44	17	20	24	39
..... concern	78	10	4	9	69	13	2	17
Commercial: Contractors; Components .	16	18	21	45	11	23	22	44
..... Equipment ..	15	21	22	43	10	28	23	40
..... Customers or clients	20	11	21	49	13	15	29	44
..... Competitors	22	32	23	23	16	35	32	17
..... Consultants	24	57	11	7	19	64	10	7
Universities	24	56	13	6	15	60	21	4
Governmental research institutes	26	51	16	7	18	44	31	7
Business organisations research inst. .	23	52	16	9	14	43	30	13
Patents documents	28	59	9	5	20	60	14	6
Commercial conferences, literature etc.	11	24	33	32	3	27	30	40
Fairs or exhibitions	9	23	32	37	2	21	38	39
Other sources of innovative ideas	96	.	1	2	95	.	0	4
Enterprises with 20 - 49 persons engaged								
Internal sources: In the enterprise ..	3	14	35	48	0	5	40	55
..... concern	58	12	12	18	49	23	8	20
Commercial: Contractors; Components .	11	11	41	38	13	8	34	45
..... Equipment ..	6	11	36	47	1	10	49	40
..... Customers or clients	8	15	9	68	18	22	2	57
..... Competitors	8	27	30	35	12	19	42	27
..... Consultants	14	59	23	5	19	60	13	7
Universities	15	52	27	6	35	37	19	9
Governmental research institutes	14	62	17	8	19	44	13	24
Business organisations research inst. .	11	39	36	14	13	26	25	36
Patents documents	21	70	9	.	39	56	5	.
Commercial conferences, literature etc.	8	23	41	29	14	16	51	20
Fairs or exhibitions	8	23	32	38	3	18	40	39
Other sources of innovative ideas	97	.	2	2	97	.	1	1
Enterprises with 50 - 99 persons engaged								
Internal sources: In the enterprise ..	3	19	21	58	0	27	10	63
..... concern	25	26	15	34	7	22	13	59
Commercial: Contractors; Components .	12	27	27	33	3	36	36	24
..... Equipment ..	7	22	34	37	1	39	36	25
..... Customers or clients	8	12	16	63	2	26	13	60
..... Competitors	12	34	25	29	3	46	15	36
..... Consultants	11	60	19	10	6	39	45	10
Universities	14	48	22	16	4	32	20	44
Governmental research institutes	12	40	29	19	3	25	22	49
Business organisations research inst. .	11	36	27	26	11	26	24	38
Patents documents	15	67	11	7	8	57	22	13
Commercial conferences, literature etc.	8	23	37	32	2	8	45	45
Fairs or exhibitions	3	25	38	34	0	31	30	39
Other sources of innovative ideas	100	.	.	.	100	.	.	.

Table 14(cont.). Sources of innovative ideas: Measured by number of enterprises and innovation costs. Employment class. 1992. Percentage

Employment class/ Sources of innovative ideas	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
Enterprises with 100 - 199 persons engaged								
Internal sources: In the enterprise ..	8	11	27	53	10	12	26	52
..... concern	37	30	11	22	28	35	11	26
Commercial: Contractors; Components .	12	15	26	47	13	11	33	42
..... Equipment ..	10	18	22	51	16	14	28	42
..... Customers or clients	11	14	14	62	9	13	19	59
..... Competitors	12	23	26	38	9	15	35	40
..... Consultants	15	53	16	15	14	41	14	31
Universities	16	52	16	15	5	56	17	21
Governmental research institutes	16	44	19	21	10	47	18	24
Business organisations research inst. .	15	33	34	18	9	34	32	24
Patents documents	19	66	10	5	9	61	25	4
Commercial conferences, literature etc.	11	19	30	40	4	12	28	56
Fairs or exhibitions	10	11	38	41	12	9	32	47
Other sources of innovative ideas	100	.	.	.	100	.	.	.
Enterprises with at least 200 persons engaged								
Internal sources: In the enterprise ..	3	14	25	57	1	6	24	68
..... concern	22	27	21	30	8	27	30	36
Commercial: Contractors; Components .	9	24	26	41	2	38	28	32
..... Equipment ..	7	19	40	35	3	34	44	19
..... Customers or clients	9	14	20	57	2	15	26	57
..... Competitors	13	29	31	27	5	16	50	29
..... Consultants	11	53	25	11	3	40	41	15
Universities	12	38	35	14	5	28	50	16
Governmental research institutes	15	40	31	14	6	24	40	30
Business organisations research inst. .	10	44	29	18	3	52	37	8
Patents documents	19	54	18	10	7	59	13	21
Commercial conferences, literature etc.	8	13	38	41	2	10	24	63
Fairs or exhibitions	5	24	34	36	1	21	43	35
Other sources of innovative ideas	98	.	1	1	99	.	1	0

Table 15. Sources of innovative ideas: Measured by number of enterprises and innovation costs. Export share-class. 1992. Percentage

Export share-class/ Sources of innovative ideas	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
Enterprises without export								
Internal sources: In the enterprise ..	15	15	24	47	6	21	14	59
..... concern	65	14	10	12	58	13	10	18
Commercial: Contractors; Components .	20	15	21	44	18	15	18	49
..... Equipment ..	13	12	23	52	13	10	21	56
..... Customers or clients	20	22	15	43	18	22	18	42
..... Competitors	23	31	23	23	25	39	20	17
..... Consultants	23	53	16	7	20	45	25	9
Universities	27	50	16	6	31	37	22	10
Governmental research institutes	28	48	19	4	32	38	27	3
Business organisations research inst. .	23	38	27	12	18	33	28	22
Patents documents	32	56	8	3	42	48	8	1
Commercial conferences, literature etc.	15	15	36	34	12	11	35	42
Fairs or exhibitions	10	18	32	40	10	21	29	41
Other sources of innovative ideas	97	.	1	2	99	.	0	1
Enterprises with less than 20 per cent export								
Internal sources: In the enterprise ..	5	11	23	61	12	7	16	65
..... concern	51	17	12	20	36	16	19	29
Commercial: Contractors; Components .	13	18	25	44	22	21	16	42
..... Equipment ..	11	18	27	44	14	12	33	41
..... Customers or clients	11	8	19	62	9	15	28	48
..... Competitors	14	23	33	30	16	19	36	29
..... Consultants	14	58	19	9	23	52	17	9
Universities	16	47	24	13	23	49	21	7
Governmental research institutes	15	46	23	16	26	53	11	10
Business organisations research inst. .	12	43	32	13	9	39	42	10
Patents documents	18	65	13	4	26	39	21	14
Commercial conferences, literature etc.	9	20	43	28	11	5	51	32
Fairs or exhibitions	5	24	40	31	10	20	35	35
Other sources of innovative ideas	99	.	1	.	100	.	0	.
Enterprises with 20 - 39 per cent export								
Internal sources: In the enterprise ..	9	6	30	55	6	1	32	61
..... concern	34	23	21	21	17	17	37	29
Commercial: Contractors; Components .	6	23	30	40	0	19	25	56
..... Equipment ..	9	26	32	34	11	13	43	34
..... Customers or clients	4	9	26	62	2	8	35	56
..... Competitors	9	36	23	32	11	26	43	20
..... Consultants	9	68	17	6	2	80	10	8
Universities	9	60	23	9	2	35	39	24
Governmental research institutes	11	57	17	15	2	28	43	27
Business organisations research inst. .	11	40	30	19	11	19	32	38
Patents documents	13	74	6	6	3	44	30	23
Commercial conferences, literature etc.	4	23	32	40	1	6	16	78
Fairs or exhibitions	4	21	32	43	1	28	38	33
Other sources of innovative ideas	100	.	.	.	100	.	.	.

Table 15(cont.). Sources of innovative ideas: Measured by number of enterprises and innovation costs. Export share-class. 1992. Percentage

Export share-class/ Sources of innovative ideas	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
Enterprises with 40 - 79 per cent export								
Internal sources: In the enterprise ..	.	21	26	53	.	12	29	59
..... concern	32	23	16	29	4	16	47	33
Commercial: Contractors; Components .	3	21	34	42	0	9	46	44
..... Equipment ..	3	16	39	42	0	26	55	19
..... Customers or clients	6	6	11	76	1	5	38	56
..... Competitors	5	19	29	47	1	8	52	38
..... Consultants	10	63	18	10	2	53	16	30
Universities	8	47	29	16	2	33	54	11
Governmental research institutes	8	44	32	16	1	12	56	31
Business organisations research inst. .	6	44	24	26	0	49	38	13
Patents documents	13	66	15	6	4	78	10	8
Commercial conferences, literature etc.	6	24	31	39	1	23	21	55
Fairs or exhibitions	5	23	31	42	1	19	37	42
Other sources of innovative ideas	98	.	2	.	97	.	3	.
Enterprises with at least 80 per cent export								
Internal sources: In the enterprise ..	3	19	32	46	0	7	22	71
..... concern	7	41	10	42	1	43	11	45
Commercial: Contractors; Components .	7	25	39	29	0	60	25	15
..... Equipment ..	3	27	46	24	0	49	38	13
..... Customers or clients	3	15	12	69	0	25	10	65
..... Competitors	8	39	27	25	0	21	46	32
..... Consultants	10	44	27	19	1	20	66	13
Universities	8	42	31	19	1	27	44	28
Governmental research institutes	10	39	24	27	1	29	27	43
Business organisations research inst. .	10	44	25	20	3	56	33	8
Patents documents	14	58	17	12	2	58	15	25
Commercial conferences, literature etc.	5	24	32	39	0	6	26	68
Fairs or exhibitions	5	24	39	32	0	19	46	35
Other sources of innovative ideas	98	.	.	2	100	.	.	0

Table 16. Sources of innovative ideas: Measured by number of enterprises and innovation costs. Innovation costs share-class. 1992. Percentage

Innovation costs share-class/ Sources of innovative ideas	Enterprises Degree of importance				Innovation costs Degree of importance			
	No re-ply	Low	Me-dium	High	No re-ply	Low	Me-dium	High
Enterprises with less than 10 000 NOK innovation costs per person engaged								
Internal sources: In the enterprise ..	10	19	33	39	2	15	48	36
..... concern	51	13	13	23	20	15	24	41
Commercial: Contractors; Components .	24	20	27	29	11	32	18	39
..... Equipment ..	19	19	31	31	9	24	26	41
..... Customers or clients	17	14	16	53	5	12	14	69
..... Competitors	24	30	20	26	11	35	16	37
..... Consultants	27	53	16	4	12	54	27	7
Universities	29	44	17	10	13	46	25	16
Governmental research institutes	29	46	17	9	13	51	27	9
Business organisations research inst. .	26	39	23	13	13	50	23	14
Patents documents	30	57	10	3	18	66	14	1
Commercial conferences, literature etc.	21	26	33	20	10	18	50	21
Fairs or exhibitions	17	27	33	23	3	27	39	31
Other sources of innovative ideas	99	.	.	1	99	.	.	1
Enterprises with 10 000 - 19 000 NOK innovation costs per person engaged								
Internal sources: In the enterprise ..	5	12	32	51	2	23	18	58
..... concern	44	25	14	18	23	52	8	17
Commercial: Contractors; Components .	14	23	21	42	12	13	23	52
..... Equipment ..	7	23	18	53	6	13	14	66
..... Customers or clients	16	9	21	54	22	3	26	49
..... Competitors	14	26	30	30	19	25	36	21
..... Consultants	18	49	21	12	23	26	25	25
Universities	18	61	14	7	14	53	28	5
Governmental research institutes	21	54	18	7	25	44	26	5
Business organisations research inst. .	18	42	26	14	16	43	17	25
Patents documents	23	67	9	2	32	56	11	1
Commercial conferences, literature etc.	7	28	32	33	10	16	23	50
Fairs or exhibitions	7	16	40	37	13	7	44	37
Other sources of innovative ideas	98	.	2	.	100	.	0	.
Enterprises with 20 000 - 39 000 NOK innovation costs per person engaged								
Internal sources: In the enterprise ..	7	13	21	60	11	12	12	65
..... concern	43	23	16	18	46	20	21	13
Commercial: Contractors; Components .	9	17	25	48	11	25	16	48
..... Equipment ..	6	9	36	49	3	8	41	48
..... Customers or clients	9	15	13	63	4	26	24	47
..... Competitors	10	28	25	37	16	29	33	22
..... Consultants	9	67	18	6	11	60	24	4
Universities	14	48	26	11	28	39	21	11
Governmental research institutes	13	49	25	13	28	40	22	10
Business organisations research inst. .	8	47	29	16	3	39	39	19
Patents documents	20	66	11	3	32	42	20	7
Commercial conferences, literature etc.	9	16	39	36	12	7	40	40
Fairs or exhibitions	6	21	36	38	3	23	36	38
Other sources of innovative ideas	100	.	.	.	100	.	.	.

Table 16(cont.). Sources of innovative ideas: Measured by number of enterprises and innovation costs. Innovation costs share-class. 1992. Percentage

Innovation costs share-class/ Sources of innovative ideas	Enterprises Degree of importance				Innovation costs Degree of importance			
	No reply	Low	Medium	High	No reply	Low	Medium	High
Enterprises with 40 000 - 59 000 NOK innovation costs per person engaged								
Internal sources: In the enterprise ..	7	14	25	54	0	14	14	72
..... concern	41	29	5	25	20	26	3	51
Commercial: Contractors; Components .	7	13	36	45	7	6	58	29
..... Equipment ..	4	14	29	54	5	8	48	39
..... Customers or clients	7	13	14	66	7	8	18	67
..... Competitors	13	36	21	30	8	44	19	28
..... Consultants	13	59	18	11	8	56	28	8
Universities	16	43	25	16	14	21	33	33
Governmental research institutes	14	45	20	21	13	23	14	49
Business organisations research inst. .	13	34	34	20	8	39	22	31
Patents documents	20	61	13	7	15	50	6	28
Commercial conferences, literature etc.	9	18	41	32	6	10	39	45
Fairs or exhibitions	2	20	36	43	5	38	24	32
Other sources of innovative ideas	95	.	4	2	92	.	8	0
Enterprises with 60 000 - 99 000 NOK innovation costs per person engaged								
Internal sources: In the enterprise ..	8	12	27	54	1	3	22	75
..... concern	42	21	13	23	6	69	9	15
Commercial: Contractors; Components .	8	19	31	42	1	68	15	16
..... Equipment ..	12	17	37	35	6	58	22	14
..... Customers or clients	4	13	17	65	0	45	19	37
..... Competitors	12	35	31	23	6	10	76	8
..... Consultants	8	58	25	10	0	41	55	4
Universities	10	56	23	12	1	22	33	45
Governmental research institutes	12	50	25	13	1	23	31	45
Business organisations research inst. .	10	50	29	12	6	63	25	7
Patents documents	13	67	12	8	3	74	21	2
Commercial conferences, literature etc.	4	15	40	40	0	8	31	61
Fairs or exhibitions	4	27	27	42	0	25	57	18
Other sources of innovative ideas	100	.	.	.	100	.	.	.
Enterprises with at least 100 000 NOK innovation costs per person engaged								
Internal sources: In the enterprise ..	8	16	21	56	2	8	28	62
..... concern	38	19	13	30	5	13	36	46
Commercial: Contractors; Components .	8	25	29	38	3	30	32	35
..... Equipment ..	6	30	33	30	3	33	49	15
..... Customers or clients	13	14	19	54	2	7	25	65
..... Competitors	10	22	37	32	2	15	42	41
..... Consultants	16	49	17	17	4	35	37	24
Universities	11	43	32	14	2	36	52	10
Governmental research institutes	13	37	30	21	2	26	43	29
Business organisations research inst. .	11	35	29	25	3	44	42	12
Patents documents	16	57	14	13	3	59	14	24
Commercial conferences, literature etc.	2	19	30	49	1	12	21	66
Fairs or exhibitions	3	17	37	43	2	15	38	45
Other sources of innovative ideas	97	.	.	3	100	.	.	0

Table 17. Factors hampering innovative activities: Measured by number of enterprises with and without innovations. Industry. 1992. Percentage

Industry/ Hampering factors	Enterprises with inovations				Enterprises without innovations			
	No reply	Low	Medium	High	No reply	Low	Medium	High
2,3 OIL EXTR., MINING AND MANUFACTURING								
Economic: Excessive perceived risks ..	12	28	23	36	32	26	14	28
..... Lack of sources of finance .	13	43	17	27	33	30	14	23
..... Innovation costs too high ..	12	27	27	35	31	22	14	33
..... Pay-off period too long	16	37	24	24	36	27	18	19
Enterprise: Lack of innovative capasity	12	21	29	39	33	21	19	27
..... Lack of skilled personnel .	12	30	32	26	31	30	19	19
..... Lack of info. on technology	15	52	25	8	34	37	19	10
..... Lack of info. on markets ..	15	44	27	15	33	32	21	13
..... Innov. cost hard to control	17	44	25	14	34	31	19	16
..... Resistance to change	15	56	20	9	34	48	13	5
..... Lack of extern. techno. aid	16	64	15	6	35	47	13	5
..... Missing chance to cooperate	16	60	17	8	34	41	16	8
..... Deficient organisation	15	51	25	9	34	40	17	9
Lack of technological opportunity	16	52	19	13	35	36	17	13
Former innovations make new superfluous	18	58	19	5	35	44	14	8
Innovations are too easy to copy	18	55	20	7	37	41	14	8
Unresponsive customers to innovations .	16	52	19	13	34	35	19	13
Uncertainty in timing of innovations ..	18	51	22	9	37	33	19	12
22 Crude petroleum/natural gas prod.								
Economic: Excessive perceived risks ..	.	10	40	50	.			
..... Lack of sources of finance .	.	50	20	30	.			
..... Innovation costs too high ..	.	30	20	50	.			
..... Pay-off period too long	10	40	20	30	.			
Enterprise: Lack of innovative capasity	10	40	40	10	.			
..... Lack of skilled personnel .	10	50	20	20	.			
..... Lack of info. on technology	10	80	10	.	.			
..... Lack of info. on markets ..	10	70	20	.	.			
..... Innov. cost hard to control	10	60	20	10	.			
..... Resistance to change	10	60	10	20	.			
..... Lack of extern. techno. aid	10	80	.	10	.			
..... Missing chance to cooperate	10	70	10	10	.			
..... Deficient organisation	10	30	50	10	.			
Lack of technological opportunity	10	60	10	20	.			
Former innovations make new superfluous	20	60	20	.	.			
Innovations are too easy to copy	20	50	30	.	.			
Unresponsive customers to innovations .	30	30	.	40	.			
Uncertainty in timing of innovations ..	20	50	10	20	.			
3 MANUFACTURING								
Economic: Excessive perceived risks ..	12	29	23	36	32	26	14	28
..... Lack of sources of finance .	14	43	17	27	32	29	14	24
..... Innovation costs too high ..	12	27	26	35	31	22	14	33
..... Pay-off period too long	16	37	24	23	36	27	18	19
Enterprise: Lack of innovative capasity	12	20	28	40	33	21	19	27
..... Lack of skilled personnel .	12	30	32	27	31	30	19	20
..... Lack of info. on technology	16	51	25	8	34	37	19	10
..... Lack of info. on markets ..	15	43	26	15	33	32	21	13
..... Innov. cost hard to control	17	43	25	14	34	30	20	16
..... Resistance to change	15	56	20	9	34	48	13	5
..... Lack of extern. techno. aid	16	63	16	5	35	47	13	5
..... Missing chance to cooperate	16	59	17	8	34	41	17	8
..... Deficient organisation	16	51	24	9	34	40	17	9
Lack of technological opportunity	17	51	20	13	35	36	16	13
Former innovations make new superfluous	18	58	19	5	35	44	13	7
Innovations are too easy to copy	18	55	20	8	37	41	14	8
Unresponsive customers to innovations .	16	53	20	11	33	35	19	12
Uncertainty in timing of innovations ..	18	51	22	8	37	32	19	12

Table 17(cont.). Factors hampering innovative activities: Measured by number of enterprises with and without innovations. Industry. 1992. Percentage

Industry/ Hampering factors	Enterprises with inovations				Enterprises without innovations			
	No re-ply	Low	Me-dium	High	No re-ply	Low	Me-dium	High
31 Food, beverages and tobacco								
Economic: Excessive perceived risks ..	18	18	36	28	30	26	16	28
..... Lack of sources of finance .	18	42	12	28	31	28	18	23
..... Innovation costs too high ..	16	18	39	27	32	20	13	35
..... Pay-off period too long	25	25	28	21	36	24	16	24
Enterprise: Lack of innovative capasity	19	13	27	40	34	24	17	25
..... Lack of skilled personnel .	15	19	28	37	31	34	20	16
..... Lack of info. on technology	21	51	22	6	33	36	20	11
..... Lack of info. on markets ..	19	49	21	10	31	37	19	13
..... Innov. cost hard to control	24	31	25	19	35	31	18	16
..... Resistance to change	21	40	30	9	33	53	11	3
..... Lack of extern. techno. aid	21	60	13	6	34	50	9	6
..... Missing chance to cooperate	21	51	21	7	32	40	18	10
..... Deficient organisation	19	36	28	16	34	44	16	7
Lack of technological opportunity	21	46	15	18	35	38	15	12
Former innovations make new superfluous	24	54	21	1	34	43	12	10
Innovations are too easy to copy	24	46	22	7	36	41	13	9
Unresponsive customers to innovations .	22	55	13	9	31	33	20	16
Uncertainty in timing of innovations ..	25	51	15	9	36	34	22	8
32 Textiles, wearing apparel, leather								
Economic: Excessive perceived risks ..	7	13	20	60	18	38	18	26
..... Lack of sources of finance .	7	33	33	27	15	41	18	26
..... Innovation costs too high ..	13	.	33	53	21	21	41	18
..... Pay-off period too long	20	20	27	33	18	32	29	21
Enterprise: Lack of innovative capasity	13	33	20	33	21	24	24	32
..... Lack of skilled personnel .	13	40	20	27	15	35	24	26
..... Lack of info. on technology	20	40	27	13	21	41	24	15
..... Lack of info. on markets ..	20	33	40	7	21	38	24	18
..... Innov. cost hard to control	20	40	27	13	18	50	21	12
..... Resistance to change	20	53	20	7	15	62	15	9
..... Lack of extern. techno. aid	20	47	20	13	21	56	21	3
..... Missing chance to cooperate	20	47	20	13	18	56	21	6
..... Deficient organisation	20	40	20	20	18	47	26	9
Lack of technological opportunity	13	53	13	20	21	41	21	18
Former innovations make new superfluous	13	53	20	13	24	53	15	9
Innovations are too easy to copy	27	40	27	7	26	47	18	9
Unresponsive customers to innovations .	13	33	27	27	21	56	21	3
Uncertainty in timing of innovations ..	20	60	20	.	26	44	21	9
33 Wood								
Economic: Excessive perceived risks ..	3	34	21	41	30	24	8	38
..... Lack of sources of finance .	10	31	21	38	31	27	14	28
..... Innovation costs too high ..	3	21	24	52	27	20	11	42
..... Pay-off period too long	7	24	31	38	36	27	18	19
Enterprise: Lack of innovative capasity	3	21	48	28	34	15	24	27
..... Lack of skilled personnel .	7	31	48	14	32	28	23	16
..... Lack of info. on technology	7	52	31	10	32	38	19	11
..... Lack of info. on markets ..	7	31	45	17	34	32	19	15
..... Innov. cost hard to control	7	38	31	24	32	30	20	18
..... Resistance to change	7	52	21	21	35	41	20	4
..... Lack of extern. techno. aid	7	66	24	3	34	42	15	9
..... Missing chance to cooperate	7	55	21	17	35	38	20	7
..... Deficient organisation	7	59	21	14	35	34	18	14
Lack of technological opportunity	10	38	38	14	35	38	16	11
Former innovations make new superfluous	10	41	45	3	35	43	16	5
Innovations are too easy to copy	7	38	24	31	38	34	22	7
Unresponsive customers to innovations .	3	52	28	17	32	34	23	11
Uncertainty in timing of innovations ..	10	48	38	3	32	27	23	18

Table 17(cont.). Factors hampering innovative activities: Measured by number of enterprises with and without innovations. Industry. 1992. Percentage

Industry/ Hampering factors	Enterprises with inovations				Enterprises without innovations			
	No re-ply	Low	Me-dium	High	No re-ply	Low	Me-dium	High
34 Paper, printing and publishing								
Economic: Excessive perceived risks ..	26	31	22	21	38	20	17	26
..... Lack of sources of finance .	26	50	10	14	40	22	13	24
..... Innovation costs too high ..	28	29	12	31	39	20	11	30
..... Pay-off period too long	33	43	9	16	43	24	14	18
Enterprise: Lack of innovative capasity	24	28	22	26	40	19	20	21
..... Lack of skilled personnel .	19	33	28	21	41	30	12	17
..... Lack of info. on technology	28	45	19	9	43	34	12	10
..... Lack of info. on markets ..	26	41	22	10	41	29	16	14
..... Innov. cost hard to control	29	40	17	14	43	22	19	16
..... Resistance to change	21	45	22	12	42	41	12	4
..... Lack of extern. techno. aid	29	62	5	3	44	42	10	3
..... Missing chance to cooperate	29	57	7	7	44	38	8	10
..... Deficient organisation	28	48	22	2	44	42	9	4
Lack of technological opportunity	33	52	14	2	42	38	11	9
Former innovations make new superfluous	29	55	9	7	42	39	13	6
Innovations are too easy to copy	28	48	16	9	47	47	6	1
Unresponsive customers to innovations .	28	47	17	9	43	36	13	8
Uncertainty in timing of innovations ..	31	53	10	5	46	34	10	10
351/2 Chemicals								
Economic: Excessive perceived risks ..	6	28	28	39	.	67	33	.
..... Lack of sources of finance .	6	61	17	17	.	67	.	33
..... Innovation costs too high ..	11	33	28	28	.	67	.	33
..... Pay-off period too long	6	39	33	22	.	67	.	33
Enterprise: Lack of innovative capasity	6	33	28	33	.	67	.	33
..... Lack of skilled personnel .	.	56	22	22	.	67	33	.
..... Lack of info. on technology	11	67	11	11	.	67	33	.
..... Lack of info. on markets ..	6	56	17	22	.	33	67	.
..... Innov. cost hard to control	11	50	33	6	.	67	33	.
..... Resistance to change	11	72	11	6	.	100	.	.
..... Lack of extern. techno. aid	11	67	17	6	.	67	33	.
..... Missing chance to cooperate	11	67	17	6	.	33	67	.
..... Deficient organisation	11	72	11	6	.	67	.	33
Lack of technological opportunity	11	28	28	33	.	67	.	33
Former innovations make new superfluous	17	56	17	11	.	33	33	33
Innovations are too easy to copy	11	67	22	.	.	33	67	.
Unresponsive customers to innovations .	11	61	22	6	.	67	33	.
Uncertainty in timing of innovations ..	17	61	17	6	.	.	100	.
354/6 Rubber and plastic products								
Economic: Excessive perceived risks ..	18	45	9	27	50	17	25	8
..... Lack of sources of finance .	18	55	18	9	33	25	17	25
..... Innovation costs too high ..	18	55	18	9	42	.	17	42
..... Pay-off period too long	18	45	27	9	50	17	8	25
Enterprise: Lack of innovative capasity	9	18	9	64	33	17	17	33
..... Lack of skilled personnel .	9	36	18	36	42	25	25	8
..... Lack of info. on technology	9	82	9	.	42	42	17	.
..... Lack of info. on markets ..	9	55	18	18	42	42	8	8
..... Innov. cost hard to control	9	64	9	18	42	58	.	.
..... Resistance to change	9	73	18	.	42	42	17	.
..... Lack of extern. techno. aid	9	91	.	.	42	33	25	.
..... Missing chance to cooperate	9	82	9	.	42	50	8	.
..... Deficient organisation	9	73	9	9	42	50	.	8
Lack of technological opportunity	9	64	9	18	42	50	.	8
Former innovations make new superfluous	9	73	9	9	33	42	8	17
Innovations are too easy to copy	18	73	9	.	42	42	17	.
Unresponsive customers to innovations .	9	64	27	.	42	42	8	8
Uncertainty in timing of innovations ..	9	45	36	9	42	42	17	.

Table 17(cont.). Factors hampering innovative activities: Measured by number of enterprises with and without innovations. Industry. 1992. Percentage

Industry/ Hampering factors	Enterprises with inovations				Enterprises without innovations			
	No reply	Low	Medium	High	No reply	Low	Medium	High
36 Mineral products								
Economic: Excessive perceived risks ..	6	50	6	38	42	27	8	23
..... Lack of sources of finance .	13	38	19	31	50	27	12	12
..... Innovation costs too high ..	6	44	25	25	42	19	8	31
..... Pay-off period too long	13	56	13	19	50	19	15	15
Enterprise: Lack of innovative capasity	6	13	31	50	35	27	8	31
..... Lack of skilled personnel .	13	25	50	13	31	38	12	19
..... Lack of info. on technology	13	50	31	6	42	38	15	4
..... Lack of info. on markets ..	19	50	25	6	38	38	15	8
..... Innov. cost hard to control	19	56	25	.	42	27	15	15
..... Resistance to change	19	50	19	13	42	35	12	12
..... Lack of extern. techno. aid	19	63	6	13	42	42	12	4
..... Missing chance to cooperate	13	56	25	6	42	38	12	8
..... Deficient organisation	19	50	25	6	38	38	15	8
Lack of technological opportunity	6	50	13	31	38	31	12	19
Former innovations make new superfluous	19	50	25	6	46	38	15	.
Innovations are too easy to copy	13	31	44	13	42	35	8	15
Unresponsive customers to innovations .	19	44	31	6	38	15	27	19
Uncertainty in timing of innovations ..	13	50	25	13	46	31	15	8
371 Iron, steel and ferroalloys								
Economic: Excessive perceived risks ..	13	38	.	50	33	33	.	33
..... Lack of sources of finance .	13	63	13	13	33	17	17	33
..... Innovation costs too high ..	13	38	25	25	33	17	17	33
..... Pay-off period too long	13	50	25	13	33	33	17	17
Enterprise: Lack of innovative capasity	.	38	13	50	17	50	17	17
..... Lack of skilled personnel .	.	38	38	25	17	50	33	.
..... Lack of info. on technology	.	88	13	.	17	67	17	.
..... Lack of info. on markets ..	.	63	13	25	17	50	.	33
..... Innov. cost hard to control	.	50	25	25	17	50	17	17
..... Resistance to change	.	63	25	13	17	67	.	17
..... Lack of extern. techno. aid	.	88	13	.	17	67	.	17
..... Missing chance to cooperate	.	88	.	13	17	67	17	.
..... Deficient organisation	.	75	13	13	17	67	.	17
Lack of technological opportunity	.	63	38	.	17	67	.	17
Former innovations make new superfluous	.	63	13	25	17	83	.	.
Innovations are too easy to copy	.	75	25	.	17	83	.	.
Unresponsive customers to innovations .	.	38	50	13	17	67	.	17
Uncertainty in timing of innovations ..	13	50	25	13	17	67	.	17
372 Non-ferrous metals								
Economic: Excessive perceived risks ..	.	33	.	67	50	50	.	.
..... Lack of sources of finance .	.	44	22	33	50	50	.	.
..... Innovation costs too high ..	.	.	44	56	50	50	.	.
..... Pay-off period too long	.	22	11	67	50	50	.	.
Enterprise: Lack of innovative capasity	.	44	22	33	25	50	.	25
..... Lack of skilled personnel .	.	56	33	11	25	50	.	25
..... Lack of info. on technology	.	67	33	.	25	50	.	25
..... Lack of info. on markets ..	.	56	22	22	25	25	25	25
..... Innov. cost hard to control	11	44	44	.	25	25	25	25
..... Resistance to change	.	100	.	.	25	50	25	.
..... Lack of extern. techno. aid	.	67	33	.	25	50	25	.
..... Missing chance to cooperate	.	67	22	11	25	75	.	.
..... Deficient organisation	.	78	22	.	25	50	.	25
Lack of technological opportunity	.	67	22	11	25	25	25	25
Former innovations make new superfluous	.	67	33	.	25	50	.	25
Innovations are too easy to copy	.	100	.	.	25	50	.	25
Unresponsive customers to innovations .	.	33	56	11	25	50	25	.
Uncertainty in timing of innovations ..	.	89	11	.	25	50	.	25

Table 17(cont.). Factors hampering innovative activities: Measured by number of enterprises with and without innovations. Industry. 1992. Percentage

Industry/ Hampering factors	Enterprises with inovations				Enterprises without innovations			
	No re-ply	Low	Me-dium	High	No re-ply	Low	Me-dium	High
381 Metal products								
Economic: Excessive perceived risks ..	5	30	26	40	33	27	14	26
..... Lack of sources of finance .	7	47	21	26	33	36	14	17
..... Innovation costs too high ..	5	37	19	40	32	22	15	31
..... Pay-off period too long	9	42	26	23	36	29	24	10
Enterprise: Lack of innovative capasity	5	9	26	60	38	18	21	23
..... Lack of skilled personnel .	5	21	30	44	32	23	18	27
..... Lack of info. on technology	9	37	37	16	36	32	22	10
..... Lack of info. on markets ..	9	42	28	21	36	24	28	12
..... Innov. cost hard to control	9	47	26	19	36	26	19	19
..... Resistance to change	9	60	21	9	37	46	14	3
..... Lack of extern. techno. aid	12	60	23	5	37	47	14	1
..... Missing chance to cooperate	12	65	19	5	37	38	18	6
..... Deficient organisation	7	53	30	9	36	33	21	10
Lack of technological opportunity	12	51	23	14	38	24	26	12
Former innovations make new superfluous	12	67	19	2	38	41	14	6
Innovations are too easy to copy	12	63	21	5	37	35	23	5
Unresponsive customers to innovations .	12	56	23	9	37	31	17	15
Uncertainty in timing of innovations ..	14	49	26	12	38	26	21	15
382 Machinery								
Economic: Excessive perceived risks ..	7	27	23	43	37	24	12	27
..... Lack of sources of finance .	7	39	18	36	39	29	17	15
..... Innovation costs too high ..	7	27	30	36	32	24	12	32
..... Pay-off period too long	9	39	27	25	39	22	24	15
Enterprise: Lack of innovative capasity	11	14	36	39	32	17	20	32
..... Lack of skilled personnel .	9	20	50	20	29	22	32	17
..... Lack of info. on technology	9	57	27	7	37	32	29	2
..... Lack of info. on markets ..	11	43	27	18	37	32	24	7
..... Innov. cost hard to control	11	41	39	9	34	20	29	17
..... Resistance to change	11	68	18	2	34	44	15	7
..... Lack of extern. techno. aid	9	59	23	9	37	41	22	.
..... Missing chance to cooperate	11	66	16	7	37	37	24	2
..... Deficient organisation	11	52	30	7	37	29	27	7
Lack of technological opportunity	11	59	20	9	37	27	17	20
Former innovations make new superfluous	18	66	14	2	37	32	22	10
Innovations are too easy to copy	16	52	23	9	37	37	12	15
Unresponsive customers to innovations .	11	59	14	16	32	29	22	17
Uncertainty in timing of innovations ..	11	52	30	7	37	24	27	12
383 Electrical apparatus and supplies								
Economic: Excessive perceived risks ..	11	30	30	30	14	43	14	29
..... Lack of sources of finance .	11	44	15	30	14	43	5	38
..... Innovation costs too high ..	7	26	37	30	10	43	14	33
..... Pay-off period too long	7	30	41	22	14	43	19	24
Enterprise: Lack of innovative capasity	4	19	33	44	19	19	19	43
..... Lack of skilled personnel .	15	30	22	33	19	24	29	29
..... Lack of info. on technology	19	41	30	11	19	52	24	5
..... Lack of info. on markets ..	15	33	33	19	19	43	29	10
..... Innov. cost hard to control	19	48	26	7	14	48	29	10
..... Resistance to change	15	67	11	7	14	81	.	5
..... Lack of extern. techno. aid	11	70	11	7	14	76	5	5
..... Missing chance to cooperate	11	59	19	11	14	67	10	10
..... Deficient organisation	15	48	33	4	14	43	38	5
Lack of technological opportunity	19	52	15	15	14	38	14	33
Former innovations make new superfluous	19	67	11	4	14	67	5	14
Innovations are too easy to copy	19	67	11	4	19	57	14	10
Unresponsive customers to innovations .	22	52	15	11	19	52	14	14
Uncertainty in timing of innovations ..	15	44	33	7	19	38	29	14

Table 17(cont.). Factors hampering innovative activities: Measured by number of enterprises with and without innovations. Industry. 1992. Percentage

Industry/ Hampering factors	Enterprises with inovations				Enterprises without innovations			
	No re-ply	Low	Me-dium	High	No re-ply	Low	Me-dium	High
384 Transport equipment								
Economic: Excessive perceived risks ..	18	32	14	36	29	19	15	38
..... Lack of sources of finance .	21	29	21	29	31	17	13	40
..... Innovation costs too high ..	7	29	18	46	31	19	10	40
..... Pay-off period too long	18	54	4	25	33	23	17	27
Enterprise: Lack of innovative capasity	11	29	21	39	29	15	19	38
..... Lack of skilled personnel .	21	39	21	18	31	27	15	27
..... Lack of info. on technology	18	57	21	4	33	38	19	10
..... Lack of info. on markets ..	21	39	29	11	35	17	29	19
..... Innov. cost hard to control	21	57	18	4	35	21	19	25
..... Resistance to change	25	54	14	7	35	48	10	6
..... Lack of extern. techno. aid	21	57	18	4	35	44	15	6
..... Missing chance to cooperate	21	54	14	11	35	33	23	8
..... Deficient organisation	21	50	18	11	35	40	15	10
Lack of technological opportunity	18	64	14	4	35	42	19	4
Former innovations make new superfluous	21	50	25	4	40	48	8	4
Innovations are too easy to copy	21	61	18	.	38	40	13	10
Unresponsive customers to innovations .	18	54	18	11	38	29	21	13
Uncertainty in timing of innovations ..	21	36	21	21	42	21	19	19
385 Scientific instr. / optical goods								
Economic: Excessive perceived risks ..	20	20	.	60	25	25	.	50
..... Lack of sources of finance .	20	.	20	60	25	50	25	.
..... Innovation costs too high ..	20	.	20	60	25	50	.	25
..... Pay-off period too long	20	20	40	20	25	50	25	.
Enterprise: Lack of innovative capasity	20	20	20	40	25	50	.	25
..... Lack of skilled personnel .	20	40	20	20	25	50	.	25
..... Lack of info. on technology	20	60	20	.	25	50	.	25
..... Lack of info. on markets ..	20	40	20	20	25	50	.	25
..... Innov. cost hard to control	20	40	20	20	25	50	.	25
..... Resistance to change	20	60	20	.	25	50	25	.
..... Lack of extern. techno. aid	20	80	.	.	50	25	.	25
..... Missing chance to cooperate	20	80	.	.	25	50	.	25
..... Deficient organisation	20	80	.	.	25	50	.	25
Lack of technological opportunity	20	40	40	.	25	25	25	25
Former innovations make new superfluous	20	80	.	.	25	50	25	.
Innovations are too easy to copy	20	60	20	.	25	25	25	25
Unresponsive customers to innovations .	20	80	.	.	25	50	25	.
Uncertainty in timing of innovations ..	20	60	20	.	25	50	.	25
39 Other manufacturing industries								
Economic: Excessive perceived risks ..	.	43	14	43	25	42	25	8
..... Lack of sources of finance .	.	57	14	29	17	50	8	25
..... Innovation costs too high ..	.	43	29	29	25	33	25	17
..... Pay-off period too long	.	43	43	14	25	50	17	8
Enterprise: Lack of innovative capasity	14	14	43	29	17	33	25	25
..... Lack of skilled personnel .	14	29	29	29	17	50	8	25
..... Lack of info. on technology	14	29	57	.	17	50	8	25
..... Lack of info. on markets ..	14	43	29	14	17	58	25	.
..... Innov. cost hard to control	14	43	.	43	17	58	25	.
..... Resistance to change	14	43	14	29	17	58	17	8
..... Lack of extern. techno. aid	14	57	29	.	17	50	17	17
..... Missing chance to cooperate	14	43	43	.	17	58	8	17
..... Deficient organisation	14	43	29	14	17	50	8	25
Lack of technological opportunity	14	43	43	.	17	42	25	17
Former innovations make new superfluous	14	57	14	14	25	67	8	.
Innovations are too easy to copy	14	86	.	.	25	58	.	17
Unresponsive customers to innovations .	.	86	.	14	17	42	33	8
Uncertainty in timing of innovations ..	14	71	14	.	25	67	.	8

Table 18. Factors hampering innovative activities: Measured by number of enterprises with and without innovations. Employment class. 1992. Percentage

Employment class/ Hampering factors	Enterprises with inovations				Enterprises without innovations			
	No re-ply	Low	Me-dium	High	No re-ply	Low	Me-dium	High
Enterprises with less than 20 persons engaged								
Economic: Excessive perceived risks ..	16	27	17	40	32	25	14	29
..... Lack of sources of finance .	21	28	11	40	33	24	16	27
..... Innovation costs too high ..	20	32	18	30	32	21	13	34
..... Pay-off period too long	24	37	21	18	37	26	17	19
Enterprise: Lack of innovative capasity	20	26	24	30	35	22	17	26
..... Lack of skilled personnel .	21	38	17	24	31	33	15	21
..... Lack of info. on technology	24	46	18	11	34	36	18	12
..... Lack of info. on markets ..	24	45	20	11	34	30	23	13
..... Innov. cost hard to control	27	34	24	15	35	29	20	17
..... Resistance to change	22	59	16	4	34	50	13	4
..... Lack of extern. techno. aid	24	56	11	9	36	45	13	6
..... Missing chance to cooperate	23	46	18	12	35	39	16	9
..... Deficient organisation	24	51	20	5	35	39	16	10
Lack of technological opportunity	23	50	22	5	36	35	15	14
Former innovations make new superfluous	22	55	20	4	37	44	13	7
Innovations are too easy to copy	23	52	17	7	38	40	14	7
Unresponsive customers to innovations .	18	54	17	11	34	34	20	12
Uncertainty in timing of innovations ..	26	43	26	6	38	34	17	11
Enterprises with 20 - 49 persons engaged								
Economic: Excessive perceived risks ..	12	21	24	42	34	21	11	35
..... Lack of sources of finance .	14	27	29	30	31	30	15	25
..... Innovation costs too high ..	11	15	32	42	32	14	17	38
..... Pay-off period too long	17	27	29	27	36	23	25	17
Enterprise: Lack of innovative capasity	15	12	33	39	31	17	24	29
..... Lack of skilled personnel .	12	18	39	30	31	28	27	15
..... Lack of info. on technology	17	42	30	11	33	42	22	4
..... Lack of info. on markets ..	15	36	35	14	31	36	21	13
..... Innov. cost hard to control	15	29	29	27	33	27	26	15
..... Resistance to change	15	56	12	17	35	46	14	6
..... Lack of extern. techno. aid	17	65	14	5	34	50	13	3
..... Missing chance to cooperate	15	56	20	9	33	42	18	8
..... Deficient organisation	17	45	21	17	33	45	17	6
Lack of technological opportunity	17	39	26	18	35	38	18	10
Former innovations make new superfluous	18	58	20	5	34	42	15	10
Innovations are too easy to copy	17	44	29	11	36	38	16	11
Unresponsive customers to innovations .	14	52	23	12	34	34	20	13
Uncertainty in timing of innovations ..	18	48	24	9	37	26	24	14
Enterprises with 50 - 99 persons engaged								
Economic: Excessive perceived risks ..	14	33	21	33	25	36	19	20
..... Lack of sources of finance .	10	42	27	21	25	42	15	17
..... Innovation costs too high ..	10	30	21	40	27	29	17	27
..... Pay-off period too long	16	38	23	22	27	31	22	20
Enterprise: Lack of innovative capasity	7	23	19	51	25	15	27	32
..... Lack of skilled personnel .	7	33	34	26	24	27	25	24
..... Lack of info. on technology	10	45	38	7	29	36	22	14
..... Lack of info. on markets ..	10	42	30	18	27	31	24	19
..... Innov. cost hard to control	14	51	16	19	29	39	10	22
..... Resistance to change	14	52	22	12	29	53	10	8
..... Lack of extern. techno. aid	11	66	19	4	25	49	15	10
..... Missing chance to cooperate	12	59	22	7	27	41	25	7
..... Deficient organisation	12	49	32	7	27	34	25	14
Lack of technological opportunity	11	52	23	14	25	36	19	20
Former innovations make new superfluous	15	62	21	3	29	49	17	5
Innovations are too easy to copy	14	62	14	11	29	47	15	8
Unresponsive customers to innovations .	15	71	8	5	25	37	20	17
Uncertainty in timing of innovations ..	15	56	21	8	29	32	25	14

Table 18(cont.). Factors hampering innovative activities: Measured by number of enterprises with and without innovations. Employment class. 1992. Percentage

Employment class/ Hampering factors	Enterprises with inovations				Enterprises without innovations			
	No reply	Low	Medium	High	No reply	Low	Medium	High
Enterprises with 100 - 199 persons engaged								
Economic: Excessive perceived risks ..	8	34	22	36	28	40	17	15
..... Lack of sources of finance .	10	56	8	26	32	49	2	17
..... Innovation costs too high ..	8	27	29	36	26	38	11	26
..... Pay-off period too long	14	40	21	26	34	36	11	19
Enterprise: Lack of innovative capasity	8	12	30	49	32	26	15	28
..... Lack of skilled personnel .	11	22	41	26	32	23	28	17
..... Lack of info. on technology	15	52	29	4	34	47	15	4
..... Lack of info. on markets ..	16	37	29	18	36	40	11	13
..... Innov. cost hard to control	16	47	27	10	34	36	21	9
..... Resistance to change	15	55	19	11	32	40	19	9
..... Lack of extern. techno. aid	15	62	15	8	36	51	13	.
..... Missing chance to cooperate	16	62	15	7	36	53	9	2
..... Deficient organisation	15	53	22	10	36	45	13	6
Lack of technological opportunity	19	52	15	14	36	45	17	2
Former innovations make new superfluous	22	51	18	10	32	47	9	13
Innovations are too easy to copy	23	49	22	5	36	51	11	2
Unresponsive customers to innovations .	21	40	23	16	36	45	9	11
Uncertainty in timing of innovations ..	18	49	23	10	34	43	13	11
Enterprises with at least 200 persons engaged								
Economic: Excessive perceived risks ..	12	30	29	30	43	19	14	24
..... Lack of sources of finance .	14	56	12	18	43	33	10	14
..... Innovation costs too high ..	11	27	32	30	43	19	10	29
..... Pay-off period too long	11	40	25	24	43	29	10	19
Enterprise: Lack of innovative capasity	10	25	33	32	33	19	24	24
..... Lack of skilled personnel .	9	34	30	27	43	29	19	10
..... Lack of info. on technology	12	65	15	8	43	29	29	.
..... Lack of info. on markets ..	11	53	22	14	43	33	19	5
..... Innov. cost hard to control	14	53	30	3	43	29	14	14
..... Resistance to change	11	56	29	4	43	38	14	5
..... Lack of extern. techno. aid	13	66	19	2	43	43	14	.
..... Missing chance to cooperate	13	71	10	5	43	48	10	.
..... Deficient organisation	10	55	26	9	43	38	19	.
Lack of technological opportunity	13	58	14	14	33	29	24	14
Former innovations make new superfluous	15	64	16	4	43	38	19	.
Innovations are too easy to copy	13	63	20	4	38	33	10	19
Unresponsive customers to innovations .	13	49	27	10	38	33	24	5
Uncertainty in timing of innovations ..	15	59	18	8	43	14	24	19

Table 19. Factors hampering innovative activities: Measured by number of enterprises with and without innovations. Export share-class. 1992. Percentage

Export share-class/ Hampering factors	Enterprises with inovations				Enterprises without innovations			
	No re-ply	Low	Me-dium	High	No re-ply	Low	Me-dium	High
Enterprises without export								
Economic: Excessive perceived risks ..	22	27	28	23	34	24	15	27
..... Lack of sources of finance .	24	42	9	25	35	26	16	23
..... Innovation costs too high ..	23	30	22	26	35	21	12	33
..... Pay-off period too long	27	40	18	16	39	24	17	20
Enterprise: Lack of innovative capasity	19	25	27	28	37	21	15	27
..... Lack of skilled personnel .	20	30	25	25	34	31	15	20
..... Lack of info. on technology	26	46	21	7	37	35	17	11
..... Lack of info. on markets ..	24	46	21	9	36	30	23	11
..... Innov. cost hard to control	27	36	23	14	38	28	18	16
..... Resistance to change	21	48	21	10	37	47	12	4
..... Lack of extern. techno. aid	25	56	14	6	38	46	10	6
..... Missing chance to cooperate	24	52	14	10	37	37	16	10
..... Deficient organisation	23	44	26	7	37	39	14	10
Lack of technological opportunity	24	50	17	9	38	34	15	13
Former innovations make new superfluous	24	58	15	2	40	41	11	7
Innovations are too easy to copy	26	54	16	4	41	40	14	6
Unresponsive customers to innovations .	23	52	18	6	38	34	18	10
Uncertainty in timing of innovations ..	26	46	21	7	41	30	19	11
Enterprises with less than 20 per cent export								
Economic: Excessive perceived risks ..	9	34	17	40	27	30	17	27
..... Lack of sources of finance .	11	47	20	22	30	39	10	22
..... Innovation costs too high ..	9	28	28	35	23	22	21	35
..... Pay-off period too long	13	34	26	27	32	33	24	12
Enterprise: Lack of innovative capasity	13	15	31	41	28	17	30	26
..... Lack of skilled personnel .	10	30	33	27	27	26	29	19
..... Lack of info. on technology	10	49	31	10	31	37	24	9
..... Lack of info. on markets ..	13	42	25	20	31	37	19	14
..... Innov. cost hard to control	15	43	28	14	27	33	26	15
..... Resistance to change	14	59	19	8	28	51	15	6
..... Lack of extern. techno. aid	14	65	15	6	31	46	19	5
..... Missing chance to cooperate	15	60	22	3	31	46	18	6
..... Deficient organisation	14	53	22	12	30	42	19	10
Lack of technological opportunity	14	47	24	15	32	36	19	14
Former innovations make new superfluous	16	66	15	3	29	42	21	9
Innovations are too easy to copy	15	55	18	12	32	39	18	12
Unresponsive customers to innovations .	14	57	18	11	30	28	25	18
Uncertainty in timing of innovations ..	18	53	23	6	32	34	19	16
Enterprises with 20 - 39 per cent export								
Economic: Excessive perceived risks ..	4	30	21	45	36	21	9	33
..... Lack of sources of finance .	6	53	19	21	30	33	6	30
..... Innovation costs too high ..	2	28	30	40	30	15	15	39
..... Pay-off period too long	11	43	30	17	33	24	15	27
Enterprise: Lack of innovative capasity	4	21	34	40	24	15	24	36
..... Lack of skilled personnel .	6	28	30	36	24	21	30	24
..... Lack of info. on technology	9	51	30	11	30	39	27	3
..... Lack of info. on markets ..	9	40	36	15	30	36	12	21
..... Innov. cost hard to control	9	53	23	15	30	36	21	12
..... Resistance to change	9	62	19	11	30	48	18	3
..... Lack of extern. techno. aid	9	74	11	6	30	39	27	3
..... Missing chance to cooperate	9	72	13	6	30	45	15	9
..... Deficient organisation	9	53	28	11	30	30	30	9
Lack of technological opportunity	13	47	26	15	27	33	24	15
Former innovations make new superfluous	15	53	26	6	30	58	6	6
Innovations are too easy to copy	13	45	32	11	30	48	9	12
Unresponsive customers to innovations .	9	51	17	23	24	36	24	15
Uncertainty in timing of innovations ..	13	57	19	11	30	33	27	9

Table 19(cont.). Factors hampering innovative activities: Measured by number of enterprises with and without innovations. Export share-class. 1992. Percentage

Export share-class/ Hampering factors	Enterprises with inovations				Enterprises without innovations			
	No re-ply	Low	Me-dium	High	No re-ply	Low	Me-dium	High
Enterprises with 40 - 79 per cent export								
Economic: Excessive perceived risks ..	10	24	21	45	32	34	5	30
..... Lack of sources of finance .	10	29	26	35	32	30	20	18
..... Innovation costs too high ..	8	23	31	39	30	30	20	20
..... Pay-off period too long	6	34	27	32	32	36	25	7
Enterprise: Lack of innovative capasity	6	13	26	55	25	23	20	32
..... Lack of skilled personnel .	8	23	44	26	30	32	18	20
..... Lack of info. on technology	11	55	29	5	32	48	14	7
..... Lack of info. on markets ..	11	31	34	24	30	32	23	16
..... Innov. cost hard to control	11	37	32	19	30	34	23	14
..... Resistance to change	11	48	27	13	34	45	11	9
..... Lack of extern. techno. aid	11	68	16	5	32	48	18	2
..... Missing chance to cooperate	11	58	21	10	32	48	20	.
..... Deficient organisation	10	50	26	15	32	41	23	5
Lack of technological opportunity	11	61	18	10	30	39	18	14
Former innovations make new superfluous	13	52	29	6	32	45	16	7
Innovations are too easy to copy	10	60	23	8	34	43	16	7
Unresponsive customers to innovations .	10	52	23	16	27	41	18	14
Uncertainty in timing of innovations ..	11	56	27	5	32	34	23	11
Enterprises with at least 80 per cent export								
Economic: Excessive perceived risks ..	8	29	22	41	14	34	21	31
..... Lack of sources of finance .	7	42	17	34	17	28	10	45
..... Innovation costs too high ..	7	22	25	46	21	31	7	41
..... Pay-off period too long	15	32	24	29	21	31	14	34
Enterprise: Lack of innovative capasity	7	25	22	46	17	34	24	24
..... Lack of skilled personnel .	7	37	32	24	14	45	28	14
..... Lack of info. on technology	14	59	19	8	14	48	31	7
..... Lack of info. on markets ..	10	56	25	8	14	48	17	21
..... Innov. cost hard to control	15	56	20	8	17	38	17	28
..... Resistance to change	15	68	12	5	17	59	14	10
..... Lack of extern. techno. aid	12	61	24	3	21	66	10	3
..... Missing chance to cooperate	12	63	14	12	17	66	17	.
..... Deficient organisation	14	64	20	2	17	62	14	7
Lack of technological opportunity	14	51	17	19	17	59	17	7
Former innovations make new superfluous	19	56	15	10	14	66	17	3
Innovations are too easy to copy	19	58	19	5	17	59	7	17
Unresponsive customers to innovations .	17	51	27	5	14	59	10	17
Uncertainty in timing of innovations ..	15	51	20	14	17	55	10	17

Table 20. Factors hampering innovative activities: Measured by number of enterprises with and without innovations. Innovation costs share-class. 1992. Percentage

Innovation costs share-class/ Hampering factors	Enterprises with inovations				Enterprises without innovations			
	No re-ply	Low	Me-dium	High	No re-ply	Low	Me-dium	High
Enterprises with less than 10 000 NOK innovation costs per person engaged								
Economic: Excessive perceived risks ..	24	24	26	26	.			
..... Lack of sources of finance .	23	41	13	23	.			
..... Innovation costs too high ..	23	26	19	33	.			
..... Pay-off period too long	30	34	26	10	.			
Enterprise: Lack of innovative capasity	20	16	31	33	.			
..... Lack of skilled personnel .	19	19	36	27	.			
..... Lack of info. on technology	24	40	29	7	.			
..... Lack of info. on markets ..	24	39	23	14	.			
..... Innov. cost hard to control	27	47	23	3	.			
..... Resistance to change	29	43	21	7	.			
..... Lack of extern. techno. aid	27	50	19	4	.			
..... Missing chance to cooperate	29	54	17	.	.			
..... Deficient organisation	27	40	26	7	.			
Lack of technological opportunity	27	39	19	16	.			
Former innovations make new superfluous	27	47	17	9	.			
Innovations are too easy to copy	29	53	11	7	.			
Unresponsive customers to innovations .	23	41	21	14	.			
Uncertainty in timing of innovations ..	30	46	19	6	.			
Enterprises with 10 000 - 19 000 NOK innovation costs per person engaged								
Economic: Excessive perceived risks ..	16	32	19	33	.			
..... Lack of sources of finance .	18	44	14	25	.			
..... Innovation costs too high ..	19	25	26	30	.			
..... Pay-off period too long	18	39	16	28	.			
Enterprise: Lack of innovative capasity	14	21	21	44	.			
..... Lack of skilled personnel .	14	32	25	30	.			
..... Lack of info. on technology	18	53	23	7	.			
..... Lack of info. on markets ..	18	46	21	16	.			
..... Innov. cost hard to control	21	46	21	12	.			
..... Resistance to change	14	60	16	11	.			
..... Lack of extern. techno. aid	18	60	12	11	.			
..... Missing chance to cooperate	19	60	12	9	.			
..... Deficient organisation	16	49	19	16	.			
Lack of technological opportunity	23	53	11	14	.			
Former innovations make new superfluous	21	54	18	7	.			
Innovations are too easy to copy	23	49	19	9	.			
Unresponsive customers to innovations .	18	58	18	7	.			
Uncertainty in timing of innovations ..	21	60	11	9	.			
Enterprises with 20 000 - 39 000 NOK innovation costs per person engaged								
Economic: Excessive perceived risks ..	5	34	22	39	.			
..... Lack of sources of finance .	9	52	20	20	.			
..... Innovation costs too high ..	3	32	29	36	.			
..... Pay-off period too long	11	44	20	25	.			
Enterprise: Lack of innovative capasity	6	21	24	49	.			
..... Lack of skilled personnel .	7	30	29	34	.			
..... Lack of info. on technology	10	52	32	6	.			
..... Lack of info. on markets ..	8	44	32	16	.			
..... Innov. cost hard to control	10	51	17	22	.			
..... Resistance to change	10	54	23	13	.			
..... Lack of extern. techno. aid	9	66	23	2	.			
..... Missing chance to cooperate	8	64	17	10	.			
..... Deficient organisation	9	49	33	8	.			
Lack of technological opportunity	7	55	20	18	.			
Former innovations make new superfluous	13	69	16	2	.			
Innovations are too easy to copy	13	61	23	3	.			
Unresponsive customers to innovations .	10	56	20	14	.			
Uncertainty in timing of innovations ..	10	55	22	13	.			

Table 20(cont.). Factors hampering innovative activities: Measured by number of enterprises with and without innovations. Innovation costs share-class. 1992. Percentage

Innovation costs share-class/ Hampering factors	Enterprises with inovations				Enterprises without innovations			
	No re-ply	Low	Me-dium	High	No re-ply	Low	Me-dium	High
Enterprises with 40 000 - 59 000 NOK innovation costs per person engaged								
Economic: Excessive perceived risks ..	11	30	21	38	.			
..... Lack of sources of finance .	9	34	18	39	.			
..... Innovation costs too high ..	9	20	29	43	.			
..... Pay-off period too long	11	30	36	23	.			
Enterprise: Lack of innovative capasity	7	18	34	41	.			
..... Lack of skilled personnel .	11	21	36	32	.			
..... Lack of info. on technology	13	48	23	16	.			
..... Lack of info. on markets ..	14	38	32	16	.			
..... Innov. cost hard to control	14	36	38	13	.			
..... Resistance to change	7	61	25	7	.			
..... Lack of extern. techno. aid	13	66	11	11	.			
..... Missing chance to cooperate	13	61	16	11	.			
..... Deficient organisation	13	55	27	5	.			
Lack of technological opportunity	13	61	18	9	.			
Former innovations make new superfluous	18	59	20	4	.			
Innovations are too easy to copy	18	61	16	5	.			
Unresponsive customers to innovations .	20	48	21	11	.			
Uncertainty in timing of innovations ..	18	48	27	7	.			
Enterprises with 60 000 - 99 000 NOK innovation costs per person engaged								
Economic: Excessive perceived risks ..	10	29	23	38	.			
..... Lack of sources of finance .	13	46	10	31	.			
..... Innovation costs too high ..	10	31	23	37	.			
..... Pay-off period too long	17	38	19	25	.			
Enterprise: Lack of innovative capasity	12	19	31	38	.			
..... Lack of skilled personnel .	12	38	31	19	.			
..... Lack of info. on technology	15	56	19	10	.			
..... Lack of info. on markets ..	15	48	23	13	.			
..... Innov. cost hard to control	17	37	27	19	.			
..... Resistance to change	13	69	13	4	.			
..... Lack of extern. techno. aid	15	73	10	2	.			
..... Missing chance to cooperate	15	58	15	12	.			
..... Deficient organisation	13	62	19	6	.			
Lack of technological opportunity	15	48	27	10	.			
Former innovations make new superfluous	19	56	23	2	.			
Innovations are too easy to copy	13	48	31	8	.			
Unresponsive customers to innovations .	15	54	25	6	.			
Uncertainty in timing of innovations ..	17	46	29	8	.			
Enterprises with at least 100 000 NOK innovation costs per person engaged								
Economic: Excessive perceived risks ..	11	24	24	41	.			
..... Lack of sources of finance .	11	35	25	29	.			
..... Innovation costs too high ..	10	25	32	33	.			
..... Pay-off period too long	11	32	27	30	.			
Enterprise: Lack of innovative capasity	14	27	29	30	.			
..... Lack of skilled personnel .	11	40	35	14	.			
..... Lack of info. on technology	14	59	22	5	.			
..... Lack of info. on markets ..	14	48	25	13	.			
..... Innov. cost hard to control	16	38	32	14	.			
..... Resistance to change	17	52	19	11	.			
..... Lack of extern. techno. aid	16	65	14	5	.			
..... Missing chance to cooperate	14	57	21	8	.			
..... Deficient organisation	16	56	16	13	.			
Lack of technological opportunity	17	51	25	6	.			
Former innovations make new superfluous	14	59	21	6	.			
Innovations are too easy to copy	13	52	21	14	.			
Unresponsive customers to innovations .	13	60	16	11	.			
Uncertainty in timing of innovations ..	16	52	27	5	.			

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Deadline: 25 June 1993

Innovation Survey 1993

This questionnaire is concerned with technological innovation.
A **technology** can be interpreted broadly as the whole complex of knowledge, skills, routines, competence, equipment and engineering practice which are necessary to produce a product.

An innovation occurs when a new or changed products is introduced to the market, or when a new or changed process is used in commercial production. We are concerned with products and processes which are **new to your enterprise.**

Definitions

New products

In the questionnaire we distinguish two types of product innovation: "significant" and "incremental" innovations. They are defined as follows:

A **significant innovation** is a newly-marked product whose intended use, performance characteristics, technical construction, design, or use of materials and components is new or substantially changed. Such innovations can involve radically new technologies, or can be based on combining existing technologies in new uses.

An incremental innovation is an existing product whose technical characteristics have been enhanced or upgraded. This can take two basic forms.
- A simple product may be improved, in terms of better performance or lower cost, through use of new components or materials.
- A complex product, consisting of a number of integrated technical sub-systems, may be improved by partial changes to one or more of the sub-systems.

We leave out changes which are purely aesthetic (such as changes in colour or decoration), or which simply involve product differentiation (that is, minor design or presentation changes which differentiate the product while leaving it technically unchanged in construction or performance).

New processes

A process innovation is the adoption of new or dignificantly improved production methods. These changes may involve new equipment or production organisation or both. Process innovations may be introduced in order to make new products, or to increase efficiency with which existing products are produced.

I General information

Enterprise Structure

The questionnaire is to be filled in for your enterprise. If this is not the case, please state for which part of the group you are responding for, and please read this for "enterprise" in the rest of the questionnaire:

_____

Is your enterprise
independent? ☐ part of a group? ☐ If so, is it a
"mother" enterprise? ☐
"daughter" enterprise? ☐
"sister" enterprise? ☐

If you belong to a group,
what is the country of head office? _____

If there have been any structural changes in the enterprise over the last three years which may affect the comparability of your answers to questions covering 1990-92, please specify:

_____

Economic Activities

Enterprise's main field of industrial/commercial activity:

_____

Number of employees at the end of 1992
(in full-time equivalents): _____

Turnover in 1992 (in millions NOK): _____

Domestic Sales in 1992 (% of total): _____ %

Export Sales in 1992 (% of total): _____ %

Gross fixed capital formation in 1992
(in millions NOK) _____

General Information about Innovation Activities

1. Has the enterprise developed or introduced any technologically changed or new *products* (goods or services) during 1990-92? Yes ☐ No ☐
2. Has the enterprise developed or introduced any technologically changed or new processes during 1990-92? Yes ☐ No ☐
3. Does your enterprise intend to develop or introduce any technologically changed or new products or processes in the years 1993-95? Yes ☐ No ☐

INSTRUCTIONS If the answers given to questions 1. 2. and 3. are all "no", please answer question 16.

II Costs of Innovation

4. Please estimate total innovation expenditure in 1992 distributed on cost activities and current capital expenditure.

a. Estimated total **current** expenditures on innovation activity in 1992 (in millions NOK):_____

b. Please estimate the percentage share of total current innovation expenditures attributable to the following activities:

- R&D	%
- product design	%
- trial production, training and tooling-up	%
- acquisition of patents and licences	%
- market analysis (excluding launch costs)	%
- other	%
	100 %

c. Please estimate the percentage of total current innovation expenditures (see 4 a.) which was spent on specialist services outside your enterprise (for example, for R&D, patenting, training, design): _____ %

d. Estimated total **capital** expenditure spent on investment in plant, machinery and equipment in 1992, linked to new product and process innovation (in millions NOK): _____

e. Total marketing expenditures in 1992, not only linked to new product and process innovation (in millions NOK): _____

III Impact of Innovation Activities

One quantifiable measure of innovation impacts is through sales of innovative products.

5. Please estimate the distribution of the enterprise's sales of its products at the different stages of the product lifecycle in 1992?

Product stage	Turnover
Introductory	%
Growth	%
Maturity	%
Decline	%
Total 1992 sales	100 %

6. How were the enterprise's 1992 sales distributed across these types of products?

	Total sales	Export
Products essentially unchanged during 1990-92	%	%
Products subject to incremental changes during 1990-92	%	%
Products significantly changed or introduced during 1990-92	%	%
Totalt / eksport	100 %	100 %

7. What percentage of the 1992 sales of your innovative products was new to:

- the enterprise / group only?	%
- your industry?	%
Total 1992 sales of innovative products	100 %

IV R&D Activity

Research and experimental development (R&D) comprise creative work undertaken on systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications. R&D is split into:

Basic research is experimental or theoretical work undertaken primarily to acquire new knowlwdge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.

Applied research is also original investigation undertaken in order to acquire new knowledge. It is, however, direct primarily towards a specific, practical aim or objective.

Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience that is direct towards producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

8 a. Did your enterprise engage in R&D in 1992? Yes ☐ No ☐

b. Does the enterprise perform R&D on a continuous (as opposed to occasional) basis? Yes ☐ No ☐

c i. What was the total 1992 R&D expenditure for your enterprise? (in millions NOK) _____

ii. Within your total 1992 R&D expenditure, how much did you spend on external R&D services? (in millions NOK) _____

d i. What percentage of 1992 R&D was related to *product* innovations? _____ %

ii. What percentage of 1992 R&D was related to *process* innovations? _____ %

iii. Difficult to group in either category _____ %

100 %

e. Does your enterprise plan to undertake R&D in the periode 1993-95? Yes ☐ No ☐

9. Did your enterprise have any co-operation arrangements on R&D activities with other enterprises or institutions in 1992?

Yes ☐ No ☐

Such co-operation includes active participation in joint R&D projects with other organisations. It does not necessarily imply that both partners derive commercial benefit from the venture. Pure contracting out work, where there is no active participation, is not regarded as co-operation.

If no, please continue with question 10.

If yeas, please specify the type of organisation and country of partner:

Co-operation Partner	Location of your co-operation partner: Norway	The nordic countries	EC except Denmark	Other
clients / customers	☐	☐	☐	☐
suppliers	☐	☐	☐	☐
mother-, daughter-, sister enterprises	☐	☐	☐	☐
competitors	☐	☐	☐	☐
joint ventures	☐	☐	☐	☐
consultants	☐	☐	☐	☐
government research institutes	☐	☐	☐	☐
universities / higher education	☐	☐	☐	☐
industry-operated research institutes	☐	☐	☐	☐
OTHER (please specify): _____	☐	☐	☐	☐

V Acquisition / transfer of Technology

10. Please indicate whether your enterprise has acquired any new technologies during 1992 in one or other of the following ways. You can choose more than one possibility.

Forms of Acquisition	Norway	The Nordic countries	EC except Denmark	Other
the right to use others' inventions (including licences)	☐	☐	☐	☐
results of R&D contracted out	☐	☐	☐	☐
use of consultancy services	☐	☐	☐	☐
acquisition of technology through the purchase of (part of) another enterprise	☐	☐	☐	☐
purchase of equipment	☐	☐	☐	☐
communication with / specialist services from other enterprises	☐	☐	☐	☐
hiring skilled employees	☐	☐	☐	☐
OTHER (please specify):				
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐

11. Please indicate whether your enterprise transferred any new technologies out of the enterprise in one or other of the following ways during 1992. You can choose more than one possibility.

Forms of transfer	Norway	The Nordic countries	EC except Denmark	Other
the right to use your inventions (including licences)	☐	☐	☐	☐
R&D performed for others	☐	☐	☐	☐
consultancy services for other companies	☐	☐	☐	☐
transfer of technology through the sale of part of your enterprise	☐	☐	☐	☐
communication with other enterprises	☐	☐	☐	☐
mobility of skilled employees	☐	☐	☐	☐
OTHER (please specify):				
_____	☐	☐	☐	☐
_____	☐	☐	☐	☐

INSTRUCTIONS

If you have acquired or transferred any new technology during 1992 and your enterprise is part of a group, please complete question 12. If not, please go to question 13.

12. Please indicate whether any of the above 1992 acquisitions and transfers of technology took place between the enterprise and a mother / daughter / sister enterprise, by location:
(You can choose more than one possibility).

	Norway	The nordic countries	EC except Denmark	Other
acquisition from mother / daughter / sister enterprise	☐	☐	☐	☐
transfers to mother / daughter / sister enterprise	☐	☐	☐	☐

13. Please evaluate the effectiveness of the following methods for maintaining and increasing competitiveness of *product and process* innovations introduced during 1990-92:

1 = Insignificant
2 = Slightly significant
3 = Moderately significant
4 = Very significant
5 = Crucial

Method used	**Product** innovations 1 2 3 4 5	**Process** innovations 1 2 3 4 5
patents	☐☐☐☐☐	☐☐☐☐☐
registration of design	☐☐☐☐☐	☐☐☐☐☐
secrecy	☐☐☐☐☐	☐☐☐☐☐
complexity of product design	☐☐☐☐☐	☐☐☐☐☐
having a lead time advantage over cometitors	☐☐☐☐☐	☐☐☐☐☐

VI Objectives of Innovation

We are concerned with key factors involved in the decision to develop new / improve products and processes. It may be helpful to think of these in terms of the strategy of your enterprise.

14. Please indicate the importance of the objectives of your enterprise's innovation activities during 1990-92, according to the following scale:

1 = Significant
2 = Slightly significant
3 = Moderately significant
4 = Very significant
5 = Crucial

Objective	1	2	3	4	5
Replace products being phased out	☐	☐	☐	☐	☐
Improve product quality	☐	☐	☐	☐	☐
Extend product range:					
within main product field	☐	☐	☐	☐	☐
outside main product field	☐	☐	☐	☐	☐
Increase or maintain market shares	☐	☐	☐	☐	☐
Create new markets:					
in Norway	☐	☐	☐	☐	☐
in the Nordic countries	☐	☐	☐	☐	☐
in the European Community (except Denmark)	☐	☐	☐	☐	☐
in other countries	☐	☐	☐	☐	☐
Improve production flexibility	☐	☐	☐	☐	☐
Lower production costs by:					
reducing the share of wage costs	☐	☐	☐	☐	☐
reducing materials consumption	☐	☐	☐	☐	☐
reducing energy consumption	☐	☐	☐	☐	☐
reducing product design costs	☐	☐	☐	☐	☐
reducing production lead times	☐	☐	☐	☐	☐
Reduce environmental damage	☐	☐	☐	☐	☐
Improve working conditions / safety	☐	☐	☐	☐	☐
Other objective (please specify):					
_____	☐	☐	☐	☐	☐

VII Sources of Information for Innovation

Various types of information are required in the development and introduction of new products and processes. We are interested to know more about where this information is found.

15. Please indicate the importance of the following internal sources, (these include management, production, R&D, sales and marketing functions), and / or external sources of information for your enterprise's innovation activities during 1990-92.

1 = Insignificant
2 = Slightly significant
3 = Moderately significant
4 = Very significant
5 = Crucial

Source of information	1	2	3	4	5
within the enterprise	☐	☐	☐	☐	☐
within the group of enterprises	☐	☐	☐	☐	☐
External market / commercial sources:					
suppliers of materials and components	☐	☐	☐	☐	☐
suppliers of equipment	☐	☐	☐	☐	☐
clients or customers	☐	☐	☐	☐	☐
competitors in your line of business	☐	☐	☐	☐	☐
consultancy firms	☐	☐	☐	☐	☐
Educational / research establishments:					
universities / higher education	☐	☐	☐	☐	☐
government research institutes	☐	☐	☐	☐	☐
industry-operated research institutes	☐	☐	☐	☐	☐
Generally available information					
patent disclosures	☐	☐	☐	☐	☐
professional conferences, meetings, professional journals	☐	☐	☐	☐	☐
fairs / exhibitions	☐	☐	☐	☐	☐
Other external sources (please specify):					
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐

a. Has the enterprise participated in any research-programmes administered by research-councils in 1990-1992: Yes ☐ No ☐

b. Has the enterprise made any public R&D-contracts in 1990-1992: Yes ☐ No ☐

c. Has the enterprise received any loans or any economic support from public funds to innovations / R&D in 1990-1992: Yes ☐ No ☐

VIII Factors Hampering Innovation

16. If any of the list of difficulties hindered the realisation of innovations in your enterprise during 1990-92, please indicate its relative importance to any of your innovative activities.

1 = Insignificant
2 = Slightly significant
3 = Moderately significant
4 = Very significant
5 = Crucial

Economic factors:	1	2	3	4	5
excessive perceived risk	☐	☐	☐	☐	☐
lack of appropriate sources of finance	☐	☐	☐	☐	☐
innovation costs too high	☐	☐	☐	☐	☐
pay-off period of innovation too long	☐	☐	☐	☐	☐
Enterprise factors:					
enterprise's innovation potential (e.g. R&D, design, etc.) too small	☐	☐	☐	☐	☐
lack of skilled personnel	☐	☐	☐	☐	☐
lack of information on technologies	☐	☐	☐	☐	☐
lack of information on markets	☐	☐	☐	☐	☐
innovation costs hard to control	☐	☐	☐	☐	☐
resistance to change in the enterprice	☐	☐	☐	☐	☐
deficiencies in the availability of external technical services	☐	☐	☐	☐	☐
lack of opportunities for co-operation with other firms and technologial institutions	☐	☐	☐	☐	☐
lack of adequate organization	☐	☐	☐	☐	☐
OTHER REASONS:					
lack of technological opportunities	☐	☐	☐	☐	☐
no need to innovate due to earlier innovations	☐	☐	☐	☐	☐
innovation too easy to copy	☐	☐	☐	☐	☐
lack of customer responsiveness to new products and processes	☐	☐	☐	☐	☐
uncertainity in timing of innovation	☐	☐	☐	☐	☐

Name of respondent:

Title:

Phone no.:

Fax. no.:

Signature

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