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Technopolis RCN Evaluation

User Oriented R&D in the Research Council of Norway

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Preface

The STEP-group has been asked by Technopolis to provide information on the User oriented involvement of the Research Council of Norway. The information is to be used by the team evaluating the Research Council of Norway on behalf of the Norwegian Ministry of Education, Research and Church Affairs.

We would like to stress that STEP has been asked to provide *background information* for Technopolis and the evaluation panel. This report does therefore *not* contain an evaluation of RCN user oriented programs as such. Moreover, due to the limited resources allocated to this work, STEP has focused on providing relevant data. There has not been time to provide a thorough analysis of the information provided.

According to our agreement with Technopolis, STEP has been asked to provide

- an overview of RCN's allocation of resources for user driven research, including RCN's industrial spending based on branch of industry, geography and company size.

  This survey is based on data from RCN's Foriss and Provis databases.

- a presentation of results from surveys of RCN clients made by STEP, covering (1) contract partner companies, (2) collaborating companies and (3) research institutions.

  The surveys focus primarily on the impacts of policy instruments, including technology development, flows of knowledge between firms and between institutes and firms, competence absorption, product and process development, implementation and sales of new products, as well as economic and non-economic impacts on the firm. The surveys also address the question of additionality, by looking at how firms and institutes assess changes in their behaviour and outcomes. Finally, the surveys give information on how clients assess their interactions with RCN.

STEP has also included

- a survey of relevant previous evaluations of user driven research programs, including Hervik/Waagø *Evaluering av brukerstyrt forskning* (Hervik/Waagø 1997), and surveys made by Møreforskning (Bræin 2000-a, 2000-b, 2001) and AIM (Verde 2000) for the RCN.

We would like to thank the Research Council for giving us access to relevant information. A special thanks goes to Erik Edwardsen and Jon Hekland. We would also like to thank Møreforskning for giving us access to their latest report on user oriented R&D (Bræin 2001). We would like to stress that most of the data from Møreforskning are preliminary, and may be subject to change.

The authors, Oslo, September 2001

Summary

User oriented R&D
The user oriented (or 'user driven') research and development programs of the Research Council of Norway are to contribute to wealth creation, profitability and competitiveness in industry. By involving companies as partners and co-funders of RCN programs, the authorities want to encourage increased industrial R&D activities and R&D investments. The users are to initiate, manage and partly finance R&D activities, in order to ensure that the research is relevant to the needs of industry, and that the results are used.

Although the programs originally focused on *financial* support for research and technological development only, the activities have gradually absorbed aspects of modern innovation theory. This means that the Research Council – in addition to traditional objectives like the production of new products, processes and services – also takes other factors into consideration, like for instance networking, general competence building and the companies' ability to learn (i.e. absorb new knowledge and technologies). Any attempt at mapping the effects of user oriented research and development, must take these variables into consideration.

There is a consensus in Norwegian politics regarding the need for an increase in national investments in R&D. If Norway is to reach the goal of an investment level comparable to the OECD-average as measured as a proportion of GDP, industry must take its part. Given that there is no industrial organisation that can force companies into investing more in R&D, the government must find ways of encouraging such investments. User driven research programs may be one relevant measure, provided that they actually do succeed in increasing company R&D investments.

One way of measuring the success of a policy instrument is to determine its 'additionality', meaning to what extent the measure is encouraging activities that would otherwise not have taken place. If the companies would have carried out this research in the same way regardless of RCN support, the additionality is low. On the other hand, if the RCN programs stimulate significant amounts of new R&D activities and investments, as well as networking and learning, one could say that the additionality is high. One important yardstick for RCN success must therefore be the organisation's ability to bring forth new R&D activities and investments in industry.

Other surveys
The main conclusions for an evaluation made in 1997 (Hervik/Waagø 1997) was that user driven research had been quite a successful instrument in financing industrial R&D. The authors could see significant positive effects from investments in competence building and networking. The programs had probably given fair social returns. However, there was too low additionality in the overall portfolio, and there was a relatively high uncertainty as regards economic return/profitability.

Møreforskning has made a study of user driven research (Bræin 2000-a, 2000-b, 2001, preliminary data) that shows that companies do consider the programs important. Half of them expect economic results after two years time, and 40 percent

of the companies say that these R&D projects would not have been implemented without the support of the Research Council. It also seems that public support leads to larger and more daring projects.

Møreforskning finds substantial social returns. Most important are effects like competence building, networking and technology diffusion. They find it harder to measure the direct economic effect of the projects. However, a small number of successful projects lead to a large overall profitability.

A customer survey made by AIM (Verde 2000) reveals a certain lack of administrative transparency, meaning that 'new' companies find it hard to get on the inside of the RCN apparatus. There is little renewal in the RCN company 'customer base'.

Participants

STEP presents two new studies in this report. There is a presentation of data from the RCN databases, including information on the distribution of resources and on how the RCN staff perceive the various projects.

STEP has also made a survey of Norwegian receivers of RCN user oriented funding. We distributed three questionnaires, one to company based contract partners, one to institute based contract partners and one to co-operating companies.

Data from the RCN databases (Foriss and Provis) reveal that more than 1500 firms took part in user-oriented R&D projects financed by the Industry and Energy Division in 2000[1], out of which 385 were contract partners, i.e. firms responsible for the implementation of the project. The rest were co-operating partners.

The distinction between contract partners and co-operating partners is important. We know for sure that the contract partners are heavily involved in the project R&D activities. The RCN databases do not contain information about the contribution of the co-operating firms, however. They may be mere suppliers of data or technology or they may be taking actively part in the R&D project.

The largest proportion of company participants are small and medium sized firms. This is reflected in the RCN statistics as well as in the surveys performed by STEP. STEP's survey of contract partner firms shows that as many as 60 percent of the responding firms have less than 50 employees.

[1] The 457 projects of the BRO/BRIDGE program included. BRIDGE is often not reckoned as a traditional user-oriented program.

Table 0.1: Participating Norwegian companies IE user-oriented programs 2000 (BRO/BRIDGE projects not included), number of employees, percentage of companies.

Number of employees	Number of participating companies	Percentage participating companies
0 - 100	583	56%
101 – 250	193	18%
251 – 500	133	13%
> 500	144	14%
Total	1053	

Source: RCN/IE

The STEP survey of contract partner firms shows an even distribution between firms belonging to the service and industry sectors respectively. Half of the companies are located in the eastern parts of Norway, while 25 percent belong to the western or central parts of the country.

As mentioned the number of companies taking part in RCN user driven R&D amounts to some 1500 companies, if we include the BRIDGE program for competence building and networking. As the Research Council has pointed out, this probably means that a majority of the companies that are registered as R&D performers (”FoU utførende”) by Statistics Norway are participants in one or more of the IE projects.[2]

This fact in itself does not necessarily lead to the conclusion that IE is unable to engage new companies in R&D activities. It might be that most of the companies Statistics Norway classify as R&D performers, are involved in R&D *because of* the RCN involvement. If this is the case, the Research Council has clearly succeeded.

One should also keep in mind the industrial structure of Norway. The country has many small and medium sized companies in industries that traditionally invest only small sums in R&D in most industrialised nations. This means that there is a limited number of companies that are able to perform any meaningful research in the traditional sense. It is therefore hard to ascertain whether it is possible for the Research Council to reach more companies.

It could be that RCN has reached the ‘ceiling’. On the other hand, it could also be that RCN is facing some kind of ‘lock-in’, as that the program structure may make it difficult to reach companies outside the boundaries of the major industrial branches and branch organisations.

Moreover, the AIM survey indicates that the entry threshold is high, meaning that it is hard for new companies to gain the insight needed to take advantage of the RCN services.

Møreforskning points out that the largest proportion of the IE portfolio contain traditional research projects, while the “D” for “development” is less important. As noted, this result is in accordance with our findings. This might indicate that it could

[2] Norges forskningsråd: *Årsrapport 2000, Området for Industri og Energi.*

be possible to recruit more small and medium sized companies that have the competences needed to take part in development activities.

On the other hand, one important argument for user driven research is that it is to compensate for the companies' unwillingness or inability to invest in long term competence building, i.e. research in the more narrow sense. At the same time: the further out you move towards the "D-portion" of the research and development axis, the closer you are to the policy instruments administered by SND. Any policy shift in this area must take the relationship between RCN, SND and other relevant institutions into consideration.

It seems that RCN is able to reach small and medium sized companies. 74 percent of the participating companies have less than 250 employees. Some 60 percent of the RCN funding going to contract partner companies was allocated to companies of this size. Whether RCN has reached a sensible balance between small and large companies is a political question. Under any circumstances, small and large companies should not been considered in isolation. The systemic nature of the Norwegian innovation system means that small and large companies make use of each other in competence development, not only in concrete R&D co-operation, but also in supplier/customer relationships.

Allocation of funding

The IE total budget was reduced by 16 percent in the period 1993 to 2000, and the funding of user driven R&D declined quite dramatically form 1997 to 1999. Still, the STEP survey shows that there has actually been a rise in the RCN share of innovation financing. This may be the result of the Council's strategy to focus on larger and more long-lasting projects.

Especially the smallest firms have experienced a rise in the RCN share of total innovation costs. The relative RCN share is much higher for the small firms, indicating that RCN support is decisive for the implementation of their projects.

A significant proportion of the RCN funding is allocated to small and medium sized firms. There are no figures for the final distribution of RCN funding on companies and research institutions, as the contract partners redistribute some of this funding to co-operating partners. Still, 34 percent of the Industry and Energy Division's funding for user-oriented R&D was allocated to small and medium sized contract partner companies in 2000[3]. 23 percent went to contract partner companies with more than 250 employees and 43 percent went to other types of contract partners, research institutes and university and colleges included.

Møreforskning (Bræin 2001, p. 7, preliminary data) report that in 1999 the funding of companies with strong R&D experience increased significantly in relative terms. Møreforskning finds that the largest proportion of the IE portfolio contain projects with research topics focusing on the development of new knowledge – as opposed to regular development and support activities. These findings correspond to the findings of our own surveys.

[3] SMEs defined as companies with 0 to 250 employees.

Møreforskning report a shift from a strong demand for economic returns and limited risk to more long-term projects with less emphasis on direct economic returns (Bræin 2001, preliminary data). High-risk projects may fail more easily, but they may also give rise to more radical innovations and competence building, as well as greater social return in the long run. Since the evaluation of user driven research of 1997, the message from the government has been that RCN should allow higher risk in these programs.

Innovation activities

Almost all contract and co-operation partner firms in the STEP-surveys must be considered innovative (as defined by OECD and Eurostat), meaning that they have recently introduced products, services or processes that are new *to the company*.

Moreover, among the innovative contract partner and co-operation partner firms, around one third report to have introduced products or services that are new *to the market* as well. In general only one third of Norwegian innovative firms report such innovations.

This suggest that the largest share of participants in RCN user oriented programs are among the most radical innovative firms in Norway. This, however, is not necessarily a result of RCN involvement only. It could be that radical innovators are more likely to implement R&D activities, and that firms of this kind are more prone to take advantage of RCN services and funding.

Company R&D activities

In the present policy debate the distinction between internal R&D activities and external (i.e. commissioned) R&D activities is blurred. This may be caused by a remnant of "linear" thinking, meaning a belief that companies can easily transform R&D results into new products, processes or services, regardless of whether this R&D is done in-house or by someone else. However, one should keep in mind that internal R&D activities improve the companies' ability to solve problems and make use of new knowledge and technologies, regardless of the outcome of this or that particular R&D project.

Almost all the companies responding to our surveys conduct *internal* R&D activities. Three out of four firms engage in external (commissioned) R&D and in training linked to technological innovations.

A large proportion of the firms also take part in several other forms of innovation activities, including acquisition of machinery, equipment and software. Nevertheless, the largest share of company innovation costs is allotted to internal R&D, close to twice as much as the proportion used by 'normal' Norwegian innovative firms[4]. The share of contract partner firms with external R&D is almost three times higher. Again: This does not in itself prove that the programs are causing this focus on R&D. It might be that RCN is attracting the most R&D savvy companies in the country.

[4] As defined in the Eurostat/Statistic Norway's CIS-survey. Cp. footnote on page 13.

Networks and collaboration
All firms in the STEP surveys report innovation collaboration, meaning that they take part in operative external networks to a larger degree than the 'average' innovative Norwegian firms.

Only 31 percent of the IE user oriented projects of 2000 had one participant only. This indicates that the Research Council has succeeded in making the user oriented programs vehicles for networking and competence diffusion. However, according to the participants, the networking is a result of their own efforts, not a product of RCN guidance.

Table 0.2: RCN/IE user oriented R&D projects based on networks (BRIDGE/BRO not included) 2000. Total number of projects 790. Projects may include co-operation of more than one type.

Co-operation between…	Number	Percentage
Norwegian company and Norwegian research institute	343	43%
Norwegian company and Norwegian university/college	182	23%
Several Norwegian companies	344	44%
Norwegian company and foreign R&D institution	19	2%
Norwegian company and foreign company	42	5%
Norwegian company and other types of co-operation partners	195	25%
Projects with one participant only (no network)	248	31%

Source RCN/IE.

Knowledge transfer between the partners in the R&D projects is mainly linked to meetings and presentation and practical work. Few firms report on exchange of personnel or training schemes.

Effects
The trend analysis of the R&D projects of the Research Council for the period 1995 to 1999 (Bræin 2001, pp. 63) show that the company expectations regarding the overall importance of the user oriented projects for company development are declining in the period 1997 to 1999. So do – to a certain extent – the expectations of the projects' influence on economic results. In 1995 almost 70 percent of the companies expected economic returns from the projects after two years; in 1999 only half of the firms had such expectations.

On the other hand the staff of the Research Council expects only 28 percent of the projects to show notable social economic returns (i.e. company returns plus economic benefits from spin off effects). Half of the projects are expected to show significant effects from scientific results and the involvement of R&D institutions. Moreover, RCN believes that RCN support will lead to earlier results in half of the projects.

RCN expectations for direct returns for the participating companies are more modest. The executive officers of the Council expect 17 percent of the projects to result in significant effects of this type, including larger economic returns, improved products and processes, competence building and networking.

In the STEP survey participants were asked to evaluate both effects already achieved and future results. All types of actors report that they expect more effects to materialise within two or three years than the 'amount of' effects that have already been achieved. This is not surprising. Many of the projects covered by our surveys are ongoing or have just recently been finalized. It takes time before a company can harvest the effects of R&D investments.

All respondents report that the most important effect already achieved is a strengthening of the existing knowledge base of the participants. The firms in addition report an improved ability to solve practical problems as one of the most important effects.

The contract partner firms (143) report that their specific projects have resulted in a diverse set of industrial results (patent applications, prototypes, products and services etc.). Obviously, the real value of the various types of individual 'results' may vary tremendously. These numbers therefore make sense only on an aggregate level. Altogether contract partner firms report that the projects have given birth to 348 different industrial results; in average this gives more than 2 industrial results per project.

When the project leaders evaluate the industrial results for the project as a whole, the number of industrial results rise from 348 to 597. This indicates that several industrial results can be attributed to the collaboration partners, and not only to the contract partners firms. Only half of the projects had come to an end at the time of the survey. Still, firms that have finished the project report no more results in average than those that have not yet finalized the undertaking.

114 of the contract partner firms report that they have got some scientific results from the project. By those companies that have answered this question, in average 1.6 scientific results (including conference papers, reports and articles in professional journals/trade press) have been reported. Firms that have taken part in a collaboration project are more likely to report that they have made a report or article. Projects that have been terminated in general report more scientific results than those that are not yet finalized. When evaluating the whole project (partners included), the project leaders report that there have been 313 scientific results from 111 projects (2.8 scientific results per project).

Both the contract partner firms and the institute based project leaders report that the companies have improved their ability to use research based knowledge and technology from universities and research institutes. Similarly, it seems the institutes get an improved understanding of the market's need for R&D-based knowledge and technology, and they become better at co-operating with firms.

Another important *expected* effect reported by all respondents is an increased likelihood of developing new R&D projects.

Furthermore, a large number of contract partner firms report competence building in the form of longer term R&D, improved ability to use science based knowledge, to co-operate more with the scientific community and to explore new or alternative

technology paths. This applies not only to the contract partner but also to the project as a whole.

Additionality

It goes beyond the scope of this STEP survey to map the *actual* economic returns from the user driven R&D projects. It is in any case impossible to ascertain the exact returns of such investments. The effects of such technology development and competence building will spread through the economy like ripples through water. Competences developed through the efforts in one 'failed' R&D project may lead to success in another. Other companies and institutions may make use of the technology (or the products produced with this technology), and the researchers and engineers may move to other companies, taking their competences with them.

The user driven R&D programs must be judged on the basis of more than company returns. Social returns must also be taken into consideration, general competence building and networking included.

One of the main findings of the evaluation of 1997 is that 37 percent of the projects report full additionality – i.e. the projects would not have been implemented without RCN support (Hervik/Waagø 1997).

The 1995-99 trend analysis made by Møreforskning (Bræin 2001, p. 71) concludes that for the most recent period (1997-99), 40 percent of the projects would have been cancelled or postponed without RCN support. Only 1 to 2 percent report low additionality. When asked about the significance of RCN support, only 5 percent feel that RCN has been of small importance as regards the realisation of the project, while as many as 70 percent believes that RCN support has had great significance.

Our main finding is that the additionality of RCN funding is considered particularly high by the institute based project leaders. If one looks at all the company respondents, about 15 percent report that they would have dropped the projects entirely with no RCN funding. However, close to 30 percent of the company respondents hold that the projects would have been postponed, and another 35 percent that the projects would have been reduced in the case of no RCN funding. Less than 4 percent of the firms report that the projects would have been carried out unaltered. These number are in harmony with the ones reported by Hervik/Waagø and Møreforskning.

Of the contract partner firms reporting full additionality, it is particularly the firms with between 20 and 49 employees that hold that the projects would *not* have been executed without RCN funding. Almost 30 percent of the firms in this category report this, which indicates that the medium sized contract partner firms are most dependent on RCN support. Distributed by size, additionality is particularly low among large *co-operating* firms with more than 100 employees.

One of the main findings of the Hervik/Waagø evaluation of 1997 is that the RCN funding leads to larger projects and to a faster implementation. The trend analysis also conclude that the funding leads to longer, larger and more 'exciting' projects.

All the STEP respondents expect an increased engagement in R&D as an important effect of program participation, meaning that the RCN funding might stimulate companies to invest more in R&D also outside the framework of these particular user driven research programs. Furthermore, the institute based project leaders hold that one of the expected effects for participating firms is that the companies will shift their focus from short-term to longer-term R&D.

The 'STEP companies' report low levels of agreement with the statement that RCN has contributed to the establishment of important relations with other companies and institutions. As in the AIM survey the respondents report that they are not satisfied with RCN assistance in the field of network building. This might indicate that the achieved and expected effects from co-operation is a result of the participants finding each other without the help of the Research Council.

Considering the contract partners only, there has been a rise in the proportion of innovation costs financed by RCN. In 1998, RCN in average financed 11 percent of firms' total innovation costs. In 2000, RCN share had risen to 15 percent. RCN funding as share of total innovation cost is higher for the smallest firms, especially for firms with less than 20 employees, suggesting that RCN plays an important role for these firms' ability to engage in innovation. For this size group, RCN's share has risen during the last three years from 12 to 18 percent in this period.

One important idea behind the concept of user driven research is that the users (i.e. the companies) know the needs of industry better than the RCN bureaucrats. However, only half of the STEP respondents agree that the research priorities of the RCN fit well with the research needs of the companies. One should keep in mind, however, that the RCN staff might have tried to reach branches of industry outside the groups that normally take part in these programs. There could also be a conflict between company demands for quick, short-term solutions and RCN strategies for long-term competence building.

The advisory function of RCN

In the Hervik/Waagø evaluation half of the companies report that they have received advice and guidance to a small degree only. Still, one of the main conclusions is that the RCN plays a significant role as a *finance* adviser, and that it also helps bringing firms and R&D institutions together.

The AIM customer survey executed in 2000 on behalf of the RCN Industry and Energy Division shows that most of the IE customers have discussed organisational and technological issues with the RCN, but that they are not satisfied with this function (Verde 2000). One of the main conclusions from the AIM survey is that the advisory role is not an important part of the IE customer relationship.

In the STEP surveys between 50 and 60 percent reply that the RCN has provided advice and guidance to the design of the project. The RCN particularly play an important advisory role as regards project design at the time of the application. Only one out of four report the same for the rest of the project period. Large proportions of both firms and institutes hold that the RCN has failed to give advice and guidance regarding further development of the project, regarding the use of other business and technology support measures or about the dissemination of scientific results.

It should be noted, though, that the more general remarks given by the RCN ‘customers’ reveal a positive attitude towards the Council. The participants seem particularly satisfied with the way the RCN handles applications and payments.

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Chapter 1. Introduction

1.1 On user driven R&D

1.1.1 Policy objectives

The public 'user driven' or 'user oriented' R&D programs (*brukerstyrt forskning* – under the Research Council of Norway) are based on the premise that enterprises wishing to take part in publicly funded R&D programs should have a decisive influence on the direction, control, management and implementation of the relevant programs and projects. The idea behind this concept is that the enterprises are most familiar with the needs of the market, and that they more easily will recognise opportunities for success and growth. Nevertheless, the policy guiding these programs stresses the need for close co-operation with universities, colleges and R&D institutes.

The research programs and projects should preferably have a strong potential for creating added value, including benefits to society over and above the profits generated in the participating companies. They should contribute to a more knowledge-based industrial structure that will generate long-term returns and rewards.

The Research Council of Norway administers the various programs. The firms participating shall take part in initiating, financing and governing the R&D projects. The user driven programs represent one part of the Research Council of Norway's industrial R&D programs, the other part being long-term strategic programs.

The idea of letting companies partake in the governing of research council programs, provided that they share their part of the financial burden is an old one. In Norway you can find such programs as far back as in the middle of the 1960's.

It was not until 1990, however, that you will find 'user driven programs' of present kind. The director of the research council NTNF, Rolf Skår, used the term 'user driven research' as a rhetorical device, trying to steer the research agenda in the direction the companies – and not the research institutes – wanted.

In the early nineties, the Ministry of Industry put forward several objectives for the measure:

- The R&D results are to contribute to wealth creation, profitability and competitiveness in industry.
- The programs are to contribute to increased R&D activities and investments in industry, by stimulating research that would otherwise not have taken place.
- The programs are to be oriented towards international market opportunities.
- User driven research is to contribute to networking, establishing connections between various participants in industry and research.

In the latest edition of the national budget (St.prp. nr. 1, 2000-2001, p. 89) the Ministry of Industry and Trade gives the following 'definition':

> Brukerstyrte programmer skal stimulere til økt verdiskapning i næringslivet og i samfunnet for øvrig. Hovedintensjonen med brukerstyring er at brukerne, i hovedsak bedrifter, skal initiere, styre og delefinansiere forskningsaktiviteten. Dette skal sikre at forskningen er næringsrelevant, og at resultatene tas i bruk.
>
> (User driven programs are to stimulate increased value creation in industry and the society at large. The main objective of user-orientation is that the users, most of them companies, are to initiate, manage (govern) and partly finance the research activities. This is to ensure the research is relevant to the needs of industry, and that the results are used.)

The latest government white paper on research (St. meld. Nr. 39 1998-99 *Forskning ved et tidsskille,* p. 68) has a similar description, as does the industry white paper of 1998 (St.meld.nr. 41 1998-99 *Næringspolitikk inn i det 21. århundret*, p. 104).

The white paper on research underlines that user driven research is to 'stimulate companies to focus more and use more capital on research and development. The companies shall cover at least 50 percent of the expenditure.'

The white paper on industrial policies says that the main objectives of user driven research are 'increased R&D efforts in industry and long-term value creation.' It underlines the importance of quality and risk-taking: ' Public support shall instigate, accelerate and increase the quality of R&D projects, and make companies take larger risks in their R&D efforts.'

1.1.2 Public goal: Increased R&D spending

A few years back research and innovation polices were not part of the general public debate. At the moment it seems that major politicians can hardly utter a word without mention the need for innovation, research, and a knowledge-based economy. The political consensus is that Norway invests far to little in R&D, and that industry must take the responsibility for a significant part of a build-up.

Norway spent some 1.70% of GDP on R&D in 1999. This is the lowest share among the Nordic countries. The OECD average is 2.21%. There is reason to question the interpretation of some of the statistics used in this debate. The fact that Norway spends less on R&D than the OECD average is not caused by low public investments, but by the industrial structure. Norwegian industry is dominated by a lot of (very) small and medium sized enterprises, i.e. the type of companies that do not invest much in R&D regardless of nationality.[5]

Moreover, a large proportion of Norwegian firms are in branches of industry that do not invest much in R&D in any country. This does not mean that they are not

[5] For an introduction to the Norwegian innovation system, see Thor Egil Braadland, Svein Olav Nås, Trond Einar Pedersen, Tore Sandven og Finn Ørstavik: *Innovasjon i norsk næringsliv: En ny oversikt,* STEP report No. 1 2001, Oslo.

"knowledge-intensive" in any meaningful sense of the word. They get access to updated competences and technology through personnel and investments in machinery and infrastructure. It's quite possible that significant parts of Norwegian industry can cope with the present level of R&D investments.

Still, one can argue that the relative low investments in R&D will weaken the knowledge and innovation systems as a whole. Advanced technological development in one branch of industry may stimulate innovation in another, and if there are significant deficiencies in competence development in relevant disciplines and industries, this may harm the economic system as a whole. If one follow this line of reasoning, one possible conclusion can be that Norway should alter its industrial structure, not only for the benefit of 'new' branches of industry, but in order to strengthen the economy as a whole.

One can also argue that traditional industries – that seem to get by without any heavy investments in R&D – will benefit from an increase, in that it will improve their ability to cope with technological and cultural change.

Parliament supported the previous centre Government's goal of reaching the OECD average of R&D investments within 5 years. This is a moving target depending on – among other factors – the size of the national budget. Some argue that the goal is both arbitrary and unrealistic. That is missing point. The fact is that any government that does not at least try to achieve this goal, will suffer severely politically. The politicians have tied themselves to the mast, so to speak. The real goal is to achieve any significant increase in R&D investments.

The Labour Government did not add further public investments in R&D to the May addition to the 2001 budget.[6] In the revised budget it did however present a so-called Progression Plan *(Opptrappingsplan)* for the national R&D effort. [7]

In the plan the Government underlines that research has been – and will remain – a "strong priority area". The Government objective is to reach the OECD-average as regards R&D investments as a proportion of GDP *as a minimum*. The document underlines the fact that this will involve an ambitious reinforcement of the R&D effort by the public sector as well as by industry.

It is hard to say how much the future increase will have to be in order for Norway to reach the OECD-average. By the time the previous Government's white paper on research was published (1999), the required rise was calculated to NOK 5 billion. Recent estimates show that the funding needed amounts to at least 10 billion. The divergence is mainly caused by increasing oil and gas prices leading to an increase in GDP. (The Research Council now argues that there is a need for NOK 12 billion.)

The Government will do its part in the effort to reach the OECD-average, by

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[6] "The Revised National Budget" cp. St.meld. nr. 2 2000-2001 *Revidert nasjonalbudsjett for 2001* and St.prp. nr. 85 2000-2001 *Tilleggsbevilgninger og omprioriteringer i statsbudsjettet medregnet folketrygden 2001* http://odin.dep.no/fin/rnb2001/

[7] St.prp. nr. 85 2000-2001 *Tilleggsbevilgninger og omprioriteringer i statsbudsjettet medregnet folketrygden 2001,* pp 35.

increasing the public allotments to research significantly and by proposing measures that may stimulate industry to invest more in R&D. By the Government's calculation the public investments in R&D will have to increase with an average of 1 billion NOK (EUR 0.1 million) annually by 2005. Industry will have to take care of the rest.

Given that it is a national goal to increase industry spending on R&D, and that the Research Council of Norway is responsible for the implementation of significant parts on industrial R&D policies, the tools used by the Council to stimulate industrial R&D must be scrutinized. An important question is therefore whether user oriented R&D programs contribute to an increase in industrial R&D investments, i.e. if there is any significant 'additionality'.

1.1.3 User driven R&D – definitions

It is not always totally clear what user driven or user oriented research in the Research Council mean. The use of the terms may vary.

User oriented research is often understood as all R&D financed by the Industry and Energy Division. After the present reorientation and reorganisation of the program portfolio of IE, one may expect a new emphasis on 'strategic programs' – i.e. long term research of a more 'basic' kind – but as regards the period covered by this study, the main focus has indeed been on R&D directed by the needs of industry.

IE itself seldom uses the word in the more narrow sense, demanding that the contract partner has to be a firm in order for the project to be classified as user oriented.

One may also limit user driven programs as programs targeting technological development in a specific branch of industry. In this way one will exclude cross-sectoral competence building programs like BRIDGE and TEFT. STEP has done so in its survey, and the Research Council administration often do so in their presentations.

In addition to this, the Bioprocessing Division (BF) also classifies some of its programs as user driven. Our survey does include participants in these programs. Unfortunately there are few reliable statistics on user driven BF research comparable to the ones used by IE. We have therefore not been able to render a total picture of the user oriented research of the RCN. Most aggregate data concern IE R&D.

Given the resources allotted to this study, we have chosen to use RCN data as they are. We have not tried to impose one common definition on all content. Some of the data may therefore not be entirely comparable. In general, however, the figures will give a relevant impression of the present state of user driven research.

1.2 Main focus of report

STEP has *not* been asked to evaluate the user driven research programs of the Research Council of Norway. That is the task of the evaluation panel. Instead STEP has attempted to provide relevant background material for their exercise.

Among the main themes of our study one will find:

- A study of the portfolio of user driven projects
- The relationship between user driven R&D and innovation
- Direct and indirect effects of program participation
- Additionality, i.e. whether the programs give results that would otherwise not have taken place
- The role of the RCN

1.2.1 Participants

In various ways our study refers to, describes and characterises what kinds of projects and actors that participate in user oriented research programs funded by the RCN. The reports from the company surveys particularly describe the size, branch and localisation of the different categories of responding firms. The institute survey focus on main areas of research of the projects as well as types of institutes.

The general theme of this report is innovation. We would like to find at least some tentative answers to questions like:

- How innovative or research intensive are the participants in user driven projects?
- What innovations or R&D potentials are expected from the projects?
- In what ways are the participants of the projects innovative?

It should be noted that the definition of innovation includes other activities than pure R&D. These questions will be dealt with throughout the report, particularly in the surveys conducted especially for the evaluation.

1.2.2 Effects and additionality

In addition to the investigation of innovation activities and R&D efforts, a particular focus is put on the effects of the projects, both on direct 'economical' effects and various kinds of secondary effects.

The economic effects include results as increased turnover and competitiveness, improved market positions, and the establishment of new markets.

The question of additionality of the RCN support will also be considered throughout the report. What would have happened to the projects in the case of no RCN funding?

In addition to the more traditional concept of additionality we also attempt to evaluate whether participating in RCN supported projects influence the behaviour of the participants. In the evaluation of The Norwegian Industrial and Regional Development Fund (SND) a concept of behavioural additionality was put forward as an attempt to steer the concept of additionality away from the one-sided focus on individual projects and the effect of RCN participation on the private economic involvement (Hauknes et al. 2000).

To get a broader impression of the actual effects of public support for innovation, the concept of additionality should to a larger degree encompass innovation capabilities

in general. The concept of behaviour additionality focuses more on permanent changes in the conduct of a company and particularly on the institutionalisation of innovation and R&D activities.

The value of RCN support should not be measured on the basis of one particular project only, but take into consideration long-term behavioural changes in the companies. This form for competence building may indeed lead to more innovation and more R&D activities and investments in the future. It may also improve the companies' ability to make use of new technologies and R&D produced elsewhere, i.e. it may strengthen the companies' ability to absorb new knowledge (their 'absorptive capacity')

It should be noted that this form of competence building may also benefit other participants in the innovation system, including customers and collaboration partners. Moreover, people leaving the company will bring their competences with them. Actually, even if the RCN funded project is considered a failure – i.e. it does not lead to the new or improved product, process or service the participants expected – the competence building that follows from this particular R&D activity may nevertheless lead to important innovations in the long run. We learn from our mistakes, and a method that does not fit one problem, may bring the solution in another context.

Needless to say, it is impossible to map all the effects a user driven project will have on the competences and the innovation capabilities of the participants. However, it is possible to chart some of them, and this report will try to do so. One may, for instance, look at effects on networking, competence enhancement, and technology and knowledge transfer.

1.2.3 RCN's advisory function

Another general theme of this report is the interaction between the RCN and the project participants in terms of non-financial advice and guidance. We will also look at how RCN 'customers' perceive RCN in general.

In this context the Research Council will be considered a service organisation, providing services to the 'customers', i.e. the program participants. The point is to get an impression of the quality of the services provided.

1.3 The data used

STEP has used the following sources of information when making this report:

1. Previous evaluations
2. Data from RCN databases
3. New surveys based on responses from project leaders in contract partner firms, co-operating firms and research institutes

1.3.1 Previous evaluations

We have reviewed some of the already existing studies of RCN User driven R&D, in order to give the evaluators a broader background.

These are

- an evaluation made in 1997 (Hervik/Waagø: *Evaluering av brukerstyrt forskning*, BI and NTNU, Oslo/Trondheim 1997),
- studies made by the research institute Møreforskning for RCN, based on RCN database data (Bræin/Hervik/Bergem: *Brukerstyrte prosjekter i Norges forskningsråd 1999*, preliminary versions, Molde 2000 and 2001),
- a customer survey made by the company AIM for the Research Council (Verde/Juel, Erik: *Kundetilfredshet i Industri og Energis Brukerstyrte Programmer*, Oslo and Nesoddtangen 2000)

For more information, see chapter 5.

1.3.2 RCN databases

RCN is using two databases in the administration of user driven programs: Foriss and Provis.

Foriss
Foriss is used to follow the user driven research projects and programs throughout their lives. The database contains data on the following items and more:

- Project type
- Project number
- Scientific discipline
- Project leader/executive officer in the RCN or other institutions
- Contract partner firms
- Co-operating partner firms
- Participating R&D and competence institutions
- Budget, funding and appropriations
- Address and phone number of project leader

The Industry and Energy Division as well as the Bioproduction and Processing Division use Foriss.

Note that there are two categories of participating firms, contract partner firms and co-operative or collaborating partner firms. Contract partner firms are contract partners with the RCN on the individual projects. These firms may again involve 'co-operating firms' in the R&D projects. The collaborating firms may participate actively in the projects more or less in line with the contract partner firms or they may deliver services, technology, machinery or R&D to the other participants, the contract partner included. The project leaders will normally report the existence of these firms, but the databases do not, unfortunately, contain information on the exact nature of their contribution.

Provis
The data in Provis shows how the executive officer in the RCN considers the project applications at the time the application is reviewed.

The database is divided into 11 'aspects' *(aspekter)*, out of which all have several 'marks' *(kjennetegn)*. Most aspects are based on a scale from 1 to 7, where 1 means that the project do not qualify for support. Aspect No. 11 gives a total evaluation based on all other assessments.

The Provis database is an ex ante project evaluating tool used primarily by the Industry and Energy Division.

For a presentation of the Provis and Foriss data, see chapter 4.

The RCN databases as tools for planning and information gathering
It is STEP's impression that the Industry and Energy Division (IE) has made a strong effort to improve the organisation's information gathering capability. Provis is IE's child, and this database is now used to gather information on the effects of projects as well, including number of patents, licences, sold products, doctorates, reduction in costs etc. By hiring Møreforskning to analyse Provis-data IE has also put this database into use, not only as an administrative planning tool, but also as a tool for evaluation.

It is our impression that IE is very conscious of the need for such data, and they are willing to go beyond traditional statistics in order to ascertain the overall effects of the programs. This explains why they initiated the AIM customer survey mentioned above. IE is also using modern systemic innovation theory actively when planning these kinds of intelligence gathering.

This does not mean that there are no problems connected to the use of these data. The statistics are only reliable for the last couple of years. It is often hard to compare the company data with other databases, as they are identified with 'organisation numbers' (i.e. the overall corporation) and not 'firm numbers' (i.e. the actual firm, division or geographical unit that takes part in the project). The nature of the contribution from collaborating firms (i.e. firms that are not leading contract partners) is uncertain, and the databases does not give names of contact persons in these firms.

The major problem, however, is the lack of data from the Bio-production and Processing Division (BF). BF is using the Foriss database, but the entries into the Provis database is sporadic and unreliable. BF have commissioned surveys and evaluations of individual programs, but there is no overall survey or statistics covering the relevant user oriented programs. Given the limited resources allocated to this STEP exercise, we have therefore not been able to get a picture of user driven research anchored in BF.

1.3.3 The STEP surveys

STEP has been asked to make some surveys of user driven research projects administered and co-financed by the Research Council of Norway, in order to provide more background information for the ongoing evaluation of the Research Council of Norway.

The point of departure for the surveys has been the RCN databases. According to the mandate the surveys were to include about 700 companies and 100 institutes.

In order to be able to analyse the different types of 'actors' taking part in the user oriented projects we chose to divide the company surveys into three.

One survey targeted the contract partner firms (i.e. the main company responsible for the project), another targeted collaborating firms (i.e. firms co-operating with contract partners). In some cases, however, the contract partner is a research institution. We therefore sent out a third questionnaire to 'institutes'. It should be noted that the term 'institute' is used in a very wide sense, as it covers research institutes, university/college institutes and competence centres, including subdivisions, subgroups, faculties or sections of these categories.

In both the contract partner survey and the institute survey the project leaders of the user driven projects were the ones to receive the questionnaires. We believe this is the best way to get the most well informed information about the projects. In the case of the co-operating partner survey, we could find no information as regards what particular persons to contact in the RCN databases. Instead the questionnaire was addressed to the 'managing director' or 'project responsible' person in the firms, with no personal name attached.

In the contract partner survey 361 questionnaires were sent out and 172 project leaders filled out the questionnaire. The response rate of this particular survey was 60.9 percent.

In the co-operating partner survey 390 questionnaires were sent out, and 80 responded positively by filling out the questionnaire; the response rate ended up at 39.5 percent. The particularly low response rate of this survey is striking. One possible explanation may be the questionnaire lacked a personal addressee. Other explanations might be that the collaborating partner firms are less involved in the projects and that they therefore do not feel obligated to take part in such surveys.

The institute survey was sent to 172 project leaders in institutes. Of these we received 84 questionnaires, and the response rate turned out to be 72.7 percent. The final response rates for the three surveys are presented in the table below. For more detailed reports on the response rates and the RCN databases as a point of departure for the surveys, see appendix 1.

Table 1.3.1: Response rates for the three different surveys

	A) Contract partners/project leaders - firms		B) Cooperating partners - firms		C) Contract partners/project leaders - institutes	
	Number	Percent	Number	Percent	Number	Percent
Not relevant	50	13.9	74	19.0	41	23.8
Answers	172	47.6	80	20.5	84	48.8
Total	220	60.9	154	39.5	125	72.7
No answer	141	39.1	236	60.5	47	27.3
Sum	361	100%	390	100%	172	100%

In all three of the survey presentations we focused on results of the research projects in terms of industrial and scientific results, effects achieved and effects yet to come, forms of knowledge transfer, the role of the RCN in the project as well as the respondents' view of the Research Council of Norway.

The company surveys focused particularly on general innovation activities and innovation collaboration. The institute survey also included the sources of income, company customers, types of research as well as an attempt to decide what kinds of actors play important roles in the different parts of the particular research project.

Chapter 2. General presentation

2.1 Introduction

This chapter will present the report's main findings on user oriented research in the RCN, regarding

- The portfolio of projects
- Innovation and R&D activity
- Effects
- Additionality
- The role of RCN

The focus will be on the results of the three different surveys conducted for this particular evaluation. Where suitable we will supplement our findings with data from earlier surveys of RCN user oriented research. [8]

2.2 Participants in user driven programs

2.2.1 Number of participants

In the year 2000 more than 1500 firms[9] took part in R&D projects financed by the Industry and Energy Division (according to Provis/Foriss data), out of which 385 were contract partners.

In the trend analysis made by Møreforsking on newly started company projects in 1995-1999 (Bræin 2000-b[10]), one of the findings is that the number of contract partner companies is increasing while the number of projects governed by R&D institutes, branch organisations and others are declining. The proportion led by universities and colleges was stable in the period.

2.2.2 Company sizes

Considering the size distribution of firms that took part in R&D projects financed by IE, we find from our own surveys that the largest share of participants was made up of small and medium sized firms.

The survey of *contract partner firms* show that 60 percent of the participating firms has less than 50 employees, and only 15 percent has more than 250 employees. The

[8] Data from the Møreforskning annual review for 1999 (Bræin 2001), the trend analysis from 1995-1999 (Bræin 2001), the customer satisfaction survey from 2000 (Verde 2000) and the survey of Provis/Foriss data from 2000.

[9] The BRO/BRIDGE program included.

[10] Please note that this Møreforskning report presents preliminary results.

survey to *co-operation partners* shows that 51 percent has less than 50 employees and 19 percent has more than 250 employees.

However, compared to the average firm size in Norway, the share of small and medium sized firms is low. In Norway as a whole 96 percent of firms have less than 50 employees.

Table 2.2.1: Contract partners IE user-oriented programs 2000 (BRO/BRIDGE projects not included), number of employees and RCN funding. Note that parts of the funding allotted to a contract partner may be distributed to co-operating partners by the contract partner. These co-operating partners may be companies or research institutions. These numbers include all *contract partners, not only partners taking part in the STEP surveys.*

Contract partners, number of employees	Number of contract partners	Percentage number of contract partners total	RCN funding of contract partners	Percentage RCN funding of contract partners
Companies 0 - 100	232	45%	161137	25%
Companies 101 – 250	57	11%	56163	9%
Companies 251 – 500	39	8%	57592	9%
Companies > 500	54	10%	94214	14%
Non-company contract partners (incl. research institutions)	136	26%	280717	43%
Total	518		649823	

2.2.3 Source RCN/IE Industry sectors

When looking closer at the sectors of the economy the participants belong to, the survey of contract partner firms shows an even distribution between firms belonging to the service and industry sectors respectively. Among the respondents of co-operation partner firms, there was a higher share of firms belonging to the service sector (52 percent) than the industry sector (39 percent).

2.2.4 Geographical distribution

Regarding the geographical distribution of firms taking part, Møreforsking (Hervik/Waagø, 1997) found that half of the companies were located in Eastern Norway, and 25 percent in the western or central parts of the country. Few participants were located in other parts of the country.

Our surveys reveal a similar picture, suggesting few changes in the geographical distribution of participants over time. We also found few differences in geographical distribution between contract partner firms and co-operating firms.

Our surveys show that contract partner firms and co-operation partners are quite similar when it comes to size, sector and geographical localisation, suggesting that user- oriented funding involves a set of actors with much of the same background characteristics. As we have seen earlier in this report, participants in user driven programs differ from the average Norwegian firms in that they are larger, and in that they to a larger extent belong to the industry sector. These features may link the group closer to the distribution of industrial R&D in general.

2.2.5 Other participants

Apart from company participation, user oriented research also has participants from other sectors. According to Provis/Foriss data from the year 2000, one finds 600 participants from the R&D sector, the public sector, private organisations and foreign institutions and companies.

In our survey of research institutes, competence centres and university/college institutes, we found that 72 percent of the contract partners in this segment were research institutes, while 22 percent were university/college institutes.

2.3 Innovation and R&D activity

Innovation
In the RCN Provis database for project evaluation one of the assessment criteria is linked to the expected 'amount' of innovation. The RCN officials in charge use this variable when deciding whether to recommend project support. The innovative capacity of a project is compared to the 'state of the art' in a specific area.

In the 1999 review of user driven research (Bræin 2000-b), the *expected* results of projects are evaluated (cp. p. 116). That year, the average score on the degree of innovation in the projects were 4.6, were 5 indicates a fundamental/radical innovation on a national or branch level, and 7 is the highest score.

This suggests that many of the companies that receive finance through a user oriented program in RCN are potentially 'radical' innovators, and that firms are seeking finance for projects with potential economic and technological risk.

The trend analysis 1995 to 1999 show that in the period from 1997 to 1999 the proportion of high-risk projects is increasing (Bræin 2000-b). High-risk projects might fail more easily, but they may also have a greater effect as regards profitability and the generation of spin-offs. Thus the RCN funding may have a larger effect and lead to a larger additionality.

In our company surveys[11] one of the goals has been to get a deeper understanding of what characterise the innovation activity of the firms. One finding is that almost *all* contract partner and co-operation partner firms are innovative (as defined in the Eurostat Community Innovation Survey, CIS[12]). However, contract partner firms have a higher share of firms participating in innovation activities than the co-operation partners (94 percent vs. 81 percent), suggesting that there is an unexploited innovation potential among the co-operating firms.

The fact that some co-operation partners report that they have not taken part in innovation activity during the last three years may indicate that being a collaboration

[11] Including both contract partner firms and co-operation partners.

[12] For our definition of 'innovation', see p. 29. The Community Innovation Survey is a European study of industrial innovation. Its concept of innovation is mainly based on the Oslo manual. Statistics Norway (SSB) is responsible for the Norwegian survey. CIS 2 data for Norway was gathered for the period 1995-97. The Norwegian survey includes innovation activity in firms with more than 10 employees, and industries like oil, gas and aquaculture are included.

partner does not necessarily entail *engagement* in the R&D project as such. The co-operative firms may simply have support functions. However, co-operating firms are highly innovative compared to the average national share of innovative firms, suggesting that contract partner firms are linking up with highly innovative firms in their RCN supported R&D projects.

Among the innovative contract partner and co-operation partner firms, around one third (72 percent and 60 percent respectively) report to have introduced products or services that are 'new to the market'. This suggests that the largest share of participants in RCN's user oriented research programs are among the most radical innovative firms in Norway. As a comparison, only one third of the innovative firms in the CIS survey report to have introduced products or services new to the market.

One of the main goals of innovation is strengthening the potential for value creation, profitability and competitiveness. We asked firms if their innovation activity had been marketed, and – if so – what parts of sales in 2000 consisted of innovative products or services.

The contract partner firms reported that two thirds of their sales consisted of new or improved products/services, a share being more than twice the share found in CIS (64 percent vs. 25 percent). This suggest that these firms are not only involved in development of new products or processes, but also have the ability to bring their inventions into the market.

2.3.1 Innovation input – R&D

RCN evaluate the total assessment of relevance and quality of projects and companies with strong R&D experience are given the highest marks in Provis. The annual Møreforskning review of user driven projects (Bræin 2001, preliminary version, p. 7), report that in 1999 the funding of companies with strong R&D experience increased significantly in relative terms.

Møreforskning finds that the largest proportion of the RCN Industry and Energy portfolio contained projects with research topics focusing on the development of *new knowledge* – as opposed to regular development projects and support activities (Bræin 2001, preliminary version, p. 7). These findings correspond to the findings of our own surveys.

As mentioned above almost all participating firms are innovative, and many also radically innovative, in other words strongly focused on generation of new knowledge (in a wide sense). But *how* do these firms develop the new knowledge? Is R&D the only input into the innovation processes of these firms?

In our surveys we find that contract partner firms and co-operation firms engage in many of the same innovation activities; almost all the companies conduct internal R&D activity and close to three out of four firms engage in external (commissioned) R&D as well as in training linked to technological innovations.

A large proportion of the firms also take part in several other forms of innovation activity, including market introduction of technological innovations and acquisition of machinery, equipment and software. Still, the largest share of company innovation

costs is allotted to internal R&D, close to twice as much as the proportion used on R&D by 'normal' innovative firms[13].

Compared to the 'average' innovative firm[14], companies that take part in user oriented research are less involved in pure acquisition of machinery and equipment. This is true especially for contract partner firms. This could suggest that these firms are more actively involved in direct development activities rather than depending on transfer of technology from outside the firm. On the other hand, a higher share of R&D activities will necessarily lead to a relatively lower share of other innovation activities.

Contract partner firms also use a slightly higher proportion of their innovation budget on external R&D than co-operation partners (19 percent vs. 15 percent), the share being more than twice the 'average' spending on this activity as reported in CIS. Companies in our survey are also characterised by the fact that a larger share is involved – and spend money on – market introduction of technological innovations.

Firms taking part in user oriented research programs can therefore be said to have different innovation patterns than the 'average' CIS firm: Firstly they are more actively engaged in a larger set of innovation activities than the 'normal' innovative firm. The share that takes part in external R&D and internal R&D is also much higher, meaning that they are among the most R&D intensive innovative firms in Norway.

Moreover, their innovation strategy includes external R&D actors, and the contract partner and co-operation firms have well functioning R&D networks. However, looking at the CIS data, there seems to be potentials for more innovative firms widening their external R&D networks.

2.3.2 Collaboration

All firms in the survey report innovation collaboration, meaning that they take part in operative external networks to a larger degree than the 'average' innovative CIS firms. The firms in our survey also differ in that a very large share report collaboration with the science and technology community, including universities, colleges and research institutes. On the other hand, innovation collaboration with international partners occurs more often among firms in the CIS.

2.3.3 RCN share of funding

In IE the total budget has been reduced with 16 percent in the period 1993 to 2000, and the funding of user driven R&D declined quite dramatically from 1997 to 1999. We asked the contract partner firms to report on how large share of total innovation costs could be ascribed to RCN funding.

In the period there had actually been a rise in RCN's share of funding (as share of innovation costs), both for the contract partner firms and for the co-operation firms.

[13] As reported in the CIS survey.

[14] Cf. Community Innovation Survey.

This can be the result of RCN's strategy to focus on more long-lasting and larger projects. Especially the smallest firms had experienced a rise in the RCN share of total innovation costs. The relative RCN share is much higher for the small firms meaning that the RCN plays a very important role in whether they can carry out innovation projects or not.

2.4 Effects

2.4.1 Economic results

In the following we want to highlight the most recent findings regarding the effects of user oriented projects, with a particular focus on the surveys conducted for this evaluation. The focus of the different evaluations vary, but the main conclusions of previous reports are important when interpreting new studies.

When discussing the effects of RCN support, the reports from the participants as well as from the RCN are important, both as regard effects already achieved and their expectations of future results. Expectations do, however, only give an indication regarding the possible success of user oriented programs, and the various kinds of effects are not easily measured.

The trend analysis of the R&D projects of the Research Council for the period 1995 to 1999 (Bræin 2001, pp. 63) show that the company expectations regarding the overall importance of the user oriented projects for company development are declining in the period 1997 to 1999. So do – to a certain extent – the expectations of the projects' influence on economic results. In 1995 almost 70 percent of the companies expected economic returns from the projects after two years; in 1999 only half of the firms had such expectations.

Regarding economic results the trend analysis conclude that in the period from 1995 to 1999 the RCN seems to have changed strategy towards user driven projects (Bræin 2000-b, preliminary version). A shift from a strong demand for economic returns and limited risk to more long-term projects with less emphasis on economic returns is evident. In the same period companies increasingly expect competence development as a result of project participation.

The RCN (IE) project-evaluating tool Provis takes expected economic and social returns of the user oriented projects into consideration. For the portfolio of 2000 the IE staff considers such effects in terms of expected company benefits, social economic returns, R&D content and time acceleration (time delay).

As regards social returns – defined as various external effects besides the effects benefiting the participants themselves – the RCN expects 28 percent of the projects to show notable social economic returns. However, the ex ante evaluations of the R&D content, as well as of time acceleration of the projects are considered much more important by the RCN. Half of the projects are expected to show significant effects from scientific results and involvement of R&D institutions. In half of the projects RCN expect that the support of the projects will lead to earlier results.

The evaluations of company benefits include expectations of such effects as economic returns, improved products and processes, competence building and networking. Only 17 percent of the projects are expected to give significant effects of these types.

The STEP survey targeted companies, namely contract partner firms and co-operating firms, as well as contract partner institutes (groups/entities). The project leaders of the contract partner firms and institutes report on behalf of all the participating companies in the project.

As mentioned, the participants of our surveys were asked to evaluate both achieved effects and future effects. Comparing the shares of actors reporting on the two categories of effects, one main finding is that *all* types of actors report that they expect more effects to materialise within two to three years than the 'amount of effects' that have already been achieved. This is not surprising, in that it normally will take a certain time for effects to materialise.

Of the firms reporting effects in their companies, the co-operating firms show significantly lower levels of achieved effects than the contract partner firms. The rate of unfinished projects could have served as an explanation for this, but the co-operating firms show a similar level of incomplete projects as the contract partner firms.

Moreover, when it comes to effects expected in the future, the co-operating firms continue to make cautious estimates. One tentative conclusion is that contract partner firms generally both get – and believe that they will get in the future – more positive effects than the collaborating partners.

By reporting relatively fewer effects, the level of responses from collaborating partner firms termed 'irrelevant' is correspondingly higher than for the contract partner firms and the institutes. It could be that the effects listed in the survey are not that suitable for the effects experienced or expected by co-operating firms, as they play different roles in the projects. It could be that they are not involved enough in the projects to experience as many direct effects as the contract partner companies.

In many projects, the co-operating partner firms may play a more subordinate role than the contract partner firms, often as sub-contractors. As a matter of fact, one of the assumptions made when preparing the questionnaires was that the two company types were thought to have different functions or roles in the projects, hence the two questionnaires.

Another striking outcome is that the project leaders connected to contract partner firms have different ideas regarding the effects of the project as a whole compared to institute based project leaders. The project leaders in contract partner firms generally report more profound effects than project leaders in institutes.

Actually, the institute based project leaders produce the most cautious estimates of achieved effects for firms participating in the user oriented projects. However, when estimating the effects yet to come, the project leaders in institutes are more optimistic on behalf of the participating firms than the project leaders in contract partner firms.

This is most probably due to the institute project leaders' experience with research projects. They may be more conscious of the fact that the effects of such projects in most cases take a certain amount of time to materialise.

2.4.2 Competence development and collaboration

One main finding, which corresponds very well with the Møreforskning trend analysis (Bræin 2001), is that all the respondents focus on competence development as one of the first discernible effects of participating in a user oriented project funded by the RCN. *All* the various respondents report that the most important effect already achieved is a strengthening of the existing knowledge base of the participants. This is a clear message from all the surveys.

Looking at all the company respondents as one group, above 50 percent of the firms hold that the most important effect already achieved is a strengthening of the companies' existing knowledge base. Another important effect reported by many companies is a deeper understanding of the companies' most important technological area (35 percent of all responding companies).

The first noticeable effect for companies participating in a RCN funded projects is competence building. However, the companies also find an increased practical problem-solving ability to be very important.

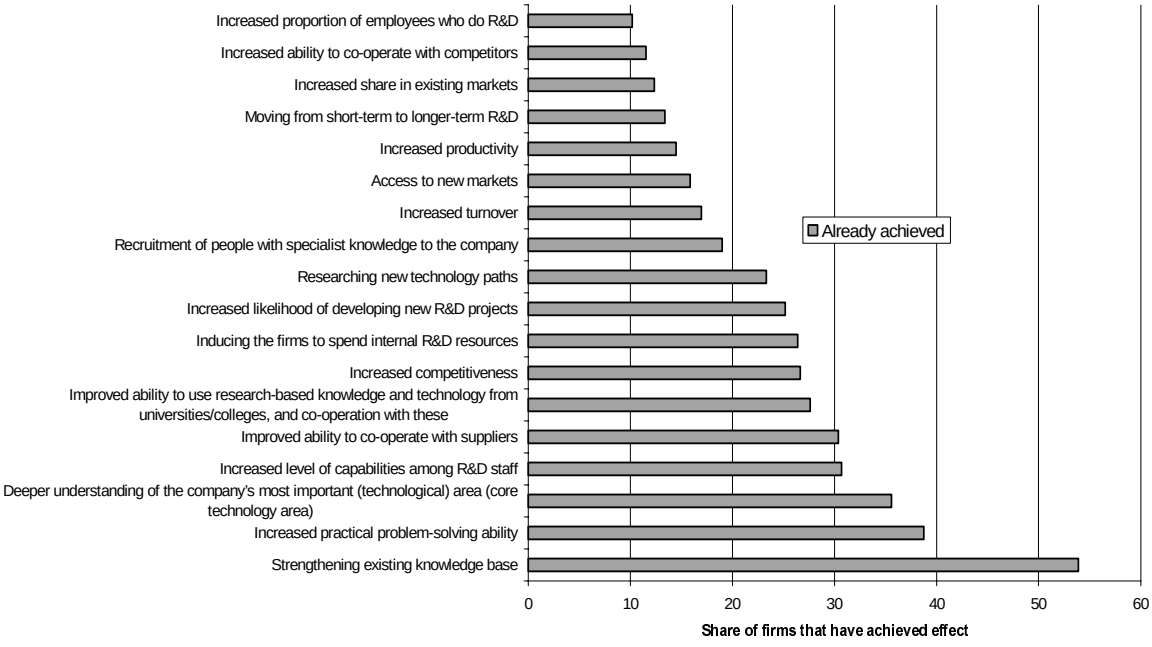


Figure 2.4.1 Already achieved effects of participation in RCN user oriented projects reported by companies (contract partners and co-operating firms combined) N=169, from STEP survey.

Both the contract partner firms and the project leaders in institutes reporting on behalf of the participating firms hold that the companies have improved their ability to use research-based knowledge and technology from universities and research institutes. This entails that the companies also have a better co-operative relationship with the scientific community. Similarly, an important achieved effect reported by

the institutes is that the institutes get an improved understanding of the market's need for R&D-based knowledge and technology, and that they develop an increased ability to co-operate with firms as a result of project participation.

One of the most striking features of the effects already achieved is therefore the dimension of improved collaboration between companies and R&D institutions. There seems to be important learning processes taking place in the co-operation projects, which are valuable to both the companies and the R&D institutions. The institutes get more adapted to – and focused on – the real R&D needs of companies, and the firms raise their level of knowledge and their R&D collaboration capability.

2.4.3 Expected effects

The respondents, especially the companies, expect more *economic* effects in the future. The RCN Provis ex ante evaluation of the projects is, however, far less optimistic when it comes to the company benefits of projects, both as regards economic return and competence building.

Considering increased competitiveness and turnover, the companies replying to our surveys on average show significantly higher expectations than the ones documented in the trend analysis and the RCN Provis evaluations. Around 70 percent of the contract partner firms and the project leaders in contract partner firms expect increased competitiveness and turnover (on behalf of the project as a whole). However, just above half of the co-operating partners expect the same, showing the same level of expected economic results as the trend analysis.

As mentioned above one of the important *effects already achieved* reported by the contract partner firms is an improved ability to use research-based knowledge and technology from universities and research institutes. An interesting result is that the co-operating firms report this effect as an *effect expected* after two to three years. This suggests that one of the advantages of being a contract partner is the development of a fairly direct improved ability to understand and make use of research-based knowledge, while it takes longer for the co-operating partners to develop the same ability.

The most important *expected* effects reported by the institutes are linked to their relationship with company partners. The highest rated effects expected within two to three years are the development of new technologies for existing firm customers, and the establishment of co-operation with new companies.

Another important expected effect reported by *all* respondents is an increased likelihood or probability of developing new R&D projects.

Some of the effects, both achieved and expected, will be further discussed later in this chapter, when considering whether the effects of the user oriented projects have influenced the behaviour of the actors involved in the RCN funded programs.

2.4.4 Industrial and scientific results

As a way of mapping the effects of the projects, we also asked the participants to report on industrial and scientific results. It turns out that *all* respondents report that new products or services, as well as new processes, methods and models, are the most important industrial results of the projects. The particular focus on new products or services as results of the R&D is not surprising, in that that these companies generally are very dedicated to the development of new or improved products or services (in the surveys measured by the shares of new products or services of sales).

Compared to the other respondents, the contract partner firms consider new prototypes and new patent applications to be of relatively high importance. As noted earlier the contract partner firms show a higher propensity than the collaborating firms to bring new products to the market. This could support the view that the contract partner firms are more focused on radical innovations, and on developing prototypes that are to be patented and brought onto the market at a later stage.

The scientific or scholarly results from the user driven projects supported by the RCN also reveal some trends. Nearly all the participants focus on the production of reports or articles for professional publications or trade press, as well as on papers for international conferences. Project leaders in institutes (reporting for the project as a whole) focus particularly on the publications of books.

2.5 Effects, additionality and the role of RCN

2.5.1 Additionality

By funding the projects, and by requiring that the companies finance no less than half of total project costs, the RCN is to contribute to an increased focus on R&D in the companies. The firms are forced to invest in R&D in order to get RCN funding. The question remains, however, whether RCN support in fact do make the companies spend more resources on R&D than they would have done without RCN support?. Much previous work has focused on this dimension of public funding, i.e. on the aspect of *additionality.*

One of the main findings of the evaluation of 1997 is that 37 percent of the projects report full additionality, in other words, the projects would not have been executed if not for RCN support (Hervik/Waagø 1997). Small firms are most likely to drop the projects in question.

The additionality of the RCN funding is also discussed in the trend analysis 1995-99 (Bræin 2001, preliminary version, p. 71). This survey concludes that for the most recent part of the period (1997-99), 40 percent of the projects would *not* have been carried out – or they would have been postponed – without RCN support.[15] Only 1 – 2 percent report low additionality. When asked about the significance of RCN support, only 5 percent feels that RCN has been of small importance as regards the

[15] This is 10 percentage points higher than for the 1995-97 portfolios. The cause for this change is unknown, but may be contributed to a change in RCN selection practices.

realisation of the project, while as many as 70 percent reports that RCN support has had great significance.

In the surveys conducted for our study the question of additionality is also addressed. The question of implementation or non-implementation of the RCN user oriented projects evaluated by the participants of our surveys does, however, not give a coherent answer. One main finding is that the additionality of the RCN funding is evaluated particularly high by the institute based project leaders.

The levels of additionality reported by contract partner and collaborating firms are on the other hand rather low.

The level of full additionality reported by contract partner and collaborating firms themselves is on the other hand rather low. If one looks at *all* company respondents, about 15 percent report that they would have given up the projects entirely with no RCN funding. However, close to 30 percent of the company respondents hold that the projects would have been postponed, and another 35 percent that the projects would have been reduced without RCN funding. Less than 4 percent of the firms report that the projects would have been carried out unaltered with no RCN support.

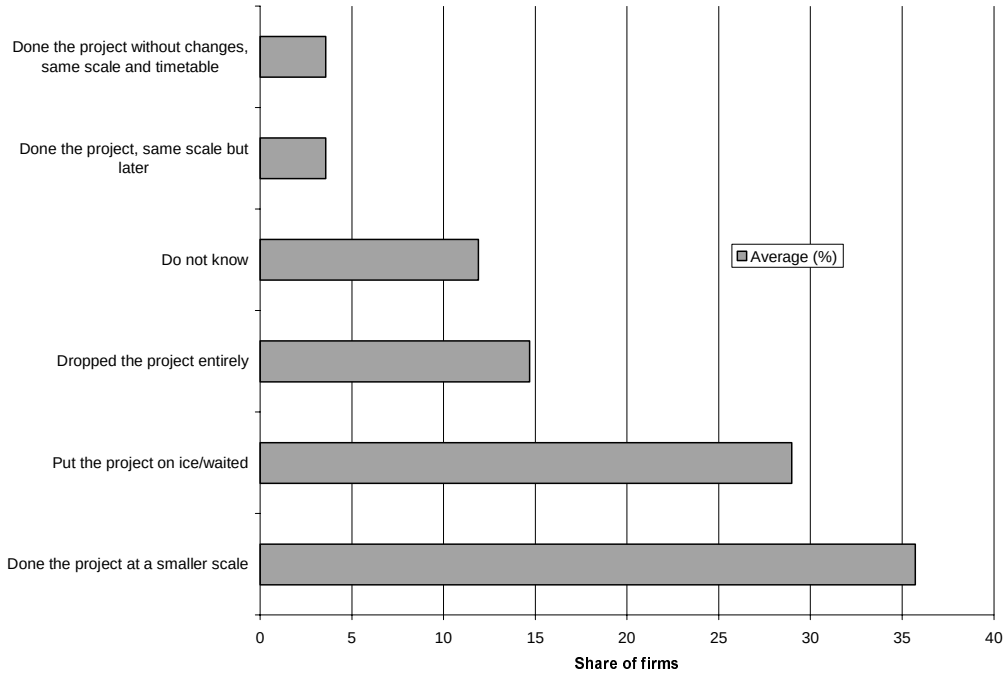


Figure 2.5.1 What companies would have done if there had been no RCN funding, percentages (responses from contract partners and co-operating firms combined) N=252, from STEP survey.

In the institute survey as many as 35 percent of the project leaders report that the projects would have been dropped entirely (full additionality), which is almost at the same level as the ones reported in the Hervik/Waagø and the trend analysis reports. Only about 2.5 percent of the project leaders in institutes report that the projects would have been executed without changes, with the same scale and timetable, with no RCN funding.

Project leaders in institutes answering on behalf of the participating firms report by far the highest levels of full additionality, while the contract partner firms report the lowest level of full additionality. Considering the number of projects which would have been realised even without RCN support, the co-operating firms are least dependent on RCN funding, in that one out of three projects would have been carried out regardless of RCN support.

2.5.2 Time aspect

Another aspects of RCN additionality is whether the funding might contribute to time acceleration and more long-term and larger R&D projects.

One of the main findings from the Hervik/Waagø evaluation of 1997 is that the RCN funding makes projects larger and contributes to a faster implementation. The trend analysis also conclude that the RCN funding leads to longer, larger and more 'exiting' projects.

In the STEP survey 38 percent of the contract partner firms report that in the situation of no RCN funding the projects would still have been carried out, but on a smaller scale. Smaller scale projects most probably are less extensive in terms of research content or 'depth'. The project funding by the RCN might make more extensive research possible, thus influencing the content of a large proportion of the projects.

20 percent of the co-operating partner firms and 30 percent of the project leaders in institutes report that the projects would have been postponed in the case of no RCN funding. By supporting these projects the RCN might have accelerated the project implementation. However, another possible explanation could be that the projects would have been carried out anyway at a later stage even without the RCN support, but that the companies would have had to spend some time finding funding elsewhere. Hence it is hard to pinpoint what would have happened to these projects in the case of no RCN support.

Like the contract partner firms the institute based project leaders also report that many projects would in fact be executed even without the RCN support, although on a smaller scale. 30 percent of the project leaders report this to be the case in a no funding situation. Consequently, the RCN funding seems to have made more extensive research possible.

2.5.3 Behavioural additionality

As presented earlier in this chapter, both the companies and the institutes achieve and expect various effects of the user driven projects, effects that would *not* have taken place without the participation in these particular RCN projects. In addition to the more traditional additionality areas considered above, we have also made attempts to catch effects more in accordance with the extended concept of additionality, namely behavioural additionality.

We focus particularly on whether the user oriented projects have contributed to a change in the behaviour of the participants of the projects – changes that have

important long-term influence on the level and the way of conducting R&D in companies and institutes.

Using the extended concept of additionality, the important considerations are not so much focusing on the actual economical effects or the triggering of private economic funding of the projects themselves. The main point is whether the participation in the user driven projects has made the actors become more involved in R&D activities. This may lead them to use more resources for innovation and R&D projects in the future, thus contributing to an increase in the level of Norwegian industry R&D investments.

As noted, one of the main effects from participation in RCN user oriented programs is an improved ability for co-operation. This is an effect that most probably would not have been there if the actors had not been participating in these RCN funded projects.

Collaboration and networking must be considered very important aspects of project participation, as it influences both the competences of the actors, as well as their future behaviour. By collaborating with the scientific community, the companies hold that they are able to make use of the particular knowledge generated by the research institutions in a better way than before. This applies to independent R&D institutes as well as university and college institutes or units. Working closely with the R&D institutions enhances the companies' absorptive capacity as regards scientific knowledge.

At the same time the R&D institutions learn a lot about the way companies handle R&D, and by working together with industry, the institutes increase their ability to understand the actual needs of companies. These kind of competences will normally be of great importance for future project development. By participating in user driven projects the scientific community as well as companies close of the gap between different cultures and ways of working.

If one focus on the behavioural effects expected in the future, the most important finding is the increased likelihood of the development of new R&D projects. *All* the actors expect an increased engagement in R&D to be an important effect of participation. In this way participation in one project may change the actors' behaviour permanently, as they focus more on R&D and are more likely to channel more resources towards innovation and R&D activities.

Furthermore, the project leaders in institutes hold that one of the expected effects for firms participating in the projects is that the companies will move their focus from short-term to longer-term R&D. Such a change most probably includes the development of company R&D strategies, making the companies more dedicated to R&D.

2.5.4 The advisory role of RCN

Apart from supporting R&D projects financially, the more general role of the RCN should be considered. Does the RCN have an advisory role in addition to its duties following its funding activities? How do the 'customers' evaluate the different

functions performed by the officials in the RCN and the RCN in general? These questions are considered below.

In the Hervik/Waagø evaluation half of the companies report that they have received advice and guidance to a small degree only (Hervik/Waagø 1997). One of the conclusions of the evaluation is that the RCN plays a significant role as a finance adviser, but also helps bringing firms and R&D institutions together.

The AIM customer survey executed in 2000 on behalf of IE shows that most of IE's customers have discussed organisational and technological issues with the RCN, but they are not satisfied with this function (Verde 2000). One of the main conclusions of the AIM survey is that the advisory role is not an important part of the IE customer relationship. 40 percent of the customers hold that they have received help in network building, but are not satisfied with the effort. It is suggested that network building is the most important service of the RCN.

In the STEP-study between 50 and 60 percent of the participants of the three surveys report that the RCN has provided advice and guidance to the design of the project. The RCN particularly play an important advisory role as regards project design at the time of the application. Around one out of four participants report the same during the course of the project.

After the end of the projects, large proportions of both the firms and the institutes in our surveys hold that RCN has failed to give advice and guidance regarding further development of the project, regarding the use of other business and technology support measures or about the dissemination of scientific results. Low scores on RCN's ability to assist the dissemination of scientific results is in line with the findings of the trend analysis, which suggest that most companies tend to keep significant R&D results for themselves as long as possible in order to benefit from competitive advantages.

All in all the findings of our surveys show that the only significant advisory role played by the RCN towards the participants of the user driven projects is in designing the projects at the time of the application.

However, the more general evaluations made by the RCN 'customers' in our surveys reveal quite a positive attitude towards the RCN. The customers seem particularly satisfied with the way that the RCN handles applications and payments. The highest level of respondents of all categories (contract partner firms, collaborating firms and projects leaders in institutes on behalf of the projects alike) agree completely that the amount of time taken to process the applications is satisfactory and that the payments are made in step with the progress of the projects. The contract partner firms and the project leaders in institutes are more positive than the collaborating partner firms (in between 45 and 50 percent as opposed to about 35 percent).

However, only a few of the respondents totally agree that the research priorities of the RCN fit well with the research needs of the companies in the projects.

In contrast to what is found in the the Hervik/Waagø evaluation 'our' companies report low levels of agreement with the statement that RCN has contributed to the establishment of important relations with other companies and institutions. As in the

AIM survey the respondents report that they are not satisfied with RCN assistance in the field of network building. This might indicate that the reported achieved and expected effects from co-operation is a result of the participants finding each other without help of the RCN.

Chapter 3. Results from the new STEP surveys

This chapter will present the surveys that have been carried out by STEP for the evaluation the Research Council of Norway with a particular focus on the user driven research projects of the RCN.

Three different surveys have been carried out; two of the surveys targeted companies and one survey targeted institutes. The specific features of the surveys are accounted for below.

In all three of the survey presentations we will focus on results of the research projects in terms of industrial and scientific results, effects achieved and effects yet to come, forms of knowledge transfer, the role of the RCN in the project as well as the respondents' view of the Research Council of Norway.

The company surveys have a particular focus on general innovation activities and innovation collaboration of the firms. In addition to the overall presentation of the results of the institute survey this particular survey includes the institutes' income sources, company customers, types of research as well as an attempt to decide what kinds of actors play important roles in the different parts of the particular research project.

The first part of this chapter accounts for the sample and the database from the RCN. Part 2 of the chapter presents the contract partner firms survey, part 3 a very similar survey sent out to co-operating partner firms. Part 4 of the chapter presents the findings from the survey sent out to various kinds of institutes.

When reading this text it would probably be helpful to keep in mind that there are four different types of participants:

Contract partners	Contract partner firms with company based project leaders	Contract partner institutes with institute based project leaders
Co-operating partners	Co-operating firms	Co-operating institutes

We have sent different questionnaires to three of these groups : Contract partner firms, contract partner institutes and co-operating firms. The co-operating institutes have not been included in our surveys.

Moreover, the respondents have been asked to respond

1. on behalf of their own institution/firm
2. on behalf of the project as a whole (the effects on project partners included)

3.1 Results from the survey of contract partner firms

This sub-chapter will present the results of the questionnaire sent to project leaders working in contract partner firms.

In the questionnaire the project leaders are asked questions *on behalf of the contract partner firms* related to the firm were he or she works. Furthermore, the project leaders are asked about *one* particular RCN funded research project. The project

leaders are also invited to evaluate, on behalf of the project as a whole, the effects of the project. As clients, the project leaders are asked how they perceive RCN in general.

This sub-chapter starts out with a presentation of the distribution of the respondents (3.1.1). In section 3.1.2 we present data on contract partner firms' innovation activity, the results of their innovation activity, and how they innovate. In this section we also present data on what role RCN funding plays in relation to the innovation budgets of the companies. Moreover, there are data on what types of external actors firms relate to in innovation projects, and were these are located.

The survey has questions regarding the effects of one particular project. Section 3.1.3 presents results of the project as evaluated by the project leader in the contract partner firm. Section 3.1.4 focuses on how the contract partner firm evaluate RCN, and on additionality of the RCN funded project. Finally, section 3.1.5 gives a summary of the chapter as a whole.

3.1.1 Distribution of respondents

We received 172 answers, and have distributed the contract partner firms in terms of size, sector and locality.

Table 3.1.1 Distribution of size of firms (N=172, N=160259).

Number of employees	Number of firms	Share of firms (%)	Number of firms Norway[16]	Share of firms (%) Norway
0-19	77	45	141519	88
20-49	25	15	12267	8
50-99	18	10	4005	3
100-249	13	8	1841	1
250+	25	15	627	0
Unknown	14	8	-	-
Total	172	100	160259	100

First we measure the size of firms by number of employees, and divide them into 5 groups. As many as 45 percent of the respondents in our sample are firms with less than 20 employees, and 15 percent of the respondents are firms with 20-49 employees.

Compared to the size distribution of firms in Norway as a whole, our sample has a greater share of large firms. In our sample 23 percent of the companies have more than 100 employees, the number for Norway as a whole is 1 percent. This distribution is as expected since other public programs in RCN give priority to smaller firms (TEFT, FORNY, RUSH). These are not included in our sample.

[16] Based on register data. Number of employees refers to total number of employees, regardless of man-hours per year, thereby including all part-time workers (including pupils and students). Number of firms refers to number of companies in register data file registered with organisation number according to domestic legislation

Table 3.1.2 Distribution of respondents into different sectors. (N=165, N=160586).

Sectors	Number of firms	Share of firms (%)	Number of firms Norway	Share of firms (%) Norway
Other	29	18	8497	5
Industry	66	40	28000	17
Services	70	42	124089	77
Total	165	100	160586	100

Out of the 172 respondents, 165 firms report on branch of industry. The table above shows that 40 percent of the respondents are found within the industry sector, and 42 percent of the respondents belong to the service sector. 18 percent of the respondents are found in sectors defined as 'other', which mainly represents the primary sector and building and construction. Compared to the sector distribution of branches in Norway as a whole, our sample has a larger proportion of firms belonging to the industry sector. The service sector is greatly underrepresented in doing user driven research.

Table 3.1.3 Distribution of respondents into parts of the country. (N=172, N=161367).

Parts of the country	Number of firms	Share of firms (%)	Number of firms Norway	Share of firms (%) Norway
Østlandet	104	60	75311	47
Vestlandet	35	20	40156	25
Mid-Norway	20	12	13660	8
Northern Norway	8	5	17647	11
Sørlandet	5	3	14593	9
Total	172	100	161367	100

The greatest number of respondents is found in the counties surrounding the capital area of Oslo and along the Oslo fjord, namely Østlandet. 60 percent of our respondents are found in this area. The western parts of Norway (Vestlandet) have 20 percent of the respondents, while the remaining parts of Norway have very small shares. In the most northern and southern parts of the country we find respectively only 5 and 3 percent of the respondents.

Looking at the distribution of firms in Norway as a whole, the table shows that the largest shares of firms are located in Østlandet and Vestlandet. Our sample is over represented in Mid-Norway and underrepresented in Northern Norway and Sørlandet.

3.1.2 Innovation activity

One of the main goals for user oriented research is that the programs are to lead to value creation, profitability, and competitiveness in industry. We have used firm innovation activity as an indicator that could lead to any of the above mentioned goals. In the following section we will use firm innovation activity to say something about what kind of firms RCN reaches through its User oriented funding.

In the questionnaire firms are asked whether they, during the period 1998-2000, had introduced technologically new or improved[17] *products*, *services* or *processes.*
In addition, the companies are asked whether they, during the same period of time, have undertaken activities aimed at developing or introducing technologically new or improved products/services or processes, which have not yet given any results. If they answer yes to these questions, they are classified as innovative.

This way of classifying innovative enterprises is exactly the same as the one used by the Community Innovation Survey carried out by Statistics Norway in 1997 (CIS Norway). In this way it is possible to compare this survey with CIS results, at least in some respects. [18]

The table and figures below presents the proportion of firms that are innovative, by size and by industry.

Table 3.1.4 Share of innovative firms/enterprises by size. (N=158, N=3203).

Size distribution	Number of firms with innovation activity	Share of firms with innovation activity (%)	Share of firms with innovation activity (%) CIS Norway 1997
0-19	72	94	24
20-49	24	96	30
50-99	17	94	37
100-249	13	100	52
250+	25	100	63
Total	151	96	31

The table above presents the proportion of firms with innovation activity, as defined above. 96 percent of the respondents are innovative, compared to 31 percent in the CIS Norway survey. Hence almost all the companies are innovative, regardless of size. Even 94 percent of the smallest firms (with less than 20 employees) report innovation activity. In Norway as a whole the share of innovative small enterprises is only 24 percent.

[17] The terms 'new' and 'improved' refer to products and processes which are new or improved from the point of view of the enterprise, but not necessarily from the point of view of the market in which the enterprise operates

[18] The survey sent out to the RCN's contract partner is not directly comparable to CIS II for many reasons: The surveys have different sampling procedures that make the distribution and the proportion of firms in different size and industry classes different.

Differences in the sample distribution on size and industry will affect the share of innovative firms. For example: the CIS II does not include firms with less than 10 employees. This will affect the share of innovative firms since innovation activity is dependent on size and industry. In some industries it takes a much longer time to introduce new products into the market than in other industries. The same problems apply to small firms; they will in general introduce fewer products or services into the market since they have a smaller portfolio than larger firms.

CIS II uses enterprises as the analysing unit, but our survey selects the firm level. CIS II also uses a stratified sample of firms for the whole country, while our survey has a schewed distribution, with a centre in Østlandet. The CIS II was weighted to be representative in relation to innovation activity in the population (the whole of Norway), while we did not select our population from these criteria. All these differences between the surveys will affect the results and must be kept in mind when comparing our results to the CIS II. When analysing the data we always control for size and industry.

This indicates that RCN has reached a group of firms that have been actively involved in innovation activities during the last three years, and that RCN has been especially good at reaching small innovative firms. This is not that surprising, given that innovative firms and companies with R&D experience are more likely to ask the Research Council for support.

There are no significant differences in innovation activity among the different sectors. In CIS the industry sector has a higher than average share of firms with innovation activity.

Innovation performance

In this section we will focus on indicators that say something about the results of firm innovation activity. The results of the innovation activity are measured as the proportion of sales in 2000 that can be accounted for by products that were new, improved or modified during the three-year period of 1998 to 2000. Only new or improved products or services are regarded as innovations. In addition to this we have also map the share of firms that have introduced products or services new not only to the firms but also to the market.

Table 3.1.5: Share of firms with new or improved products/services of sales in 2000, by size (N=148, N=1176).

Size of firms	Number of firms	Average shares of sales	Average shares of sales CIS Norway 1997
0-19	71	64	24
20-49	23	59	24
50-99	17	38	22
100-249	13	46	23
250 +	24	27	25
Total	148	54	25

The table above gives the average shares of sales in 2000 accounted for by new or improved products or services. For all firms, the average share is 54 percent. However, there are large differences between the various size groups of firms. Moreover, the shares of contract partner firms reporting innovation results are much higher than the 'national average' (54 percent vs. 25 percent).

The smallest firms actually have the largest average share of sales consisting of new or improved products/services in 2000 (64 percent). The largest group of firms has a much lower share (27 percent). The service sector shows a larger average share than the industry sector (72 percent vs. 45 percent).

Table 3.1.6. Share of firms with innovation activity that have introduced products or services 'new to the market', by size (N=155, N=1351).

Size of firms	Number of firms	Share that answered 'yes'	Share that answered 'yes' CIS Norway 1997
0-19	76	75	31
20-49	24	75	27
50-99	17	71	34
100-249	13	54	34
250+	25	72	48
Total	155	72	32

As many as 72 percent of the contract partners in the sample report that they have introduced products or services and processes new not only to the firm, but also to the market.

Surprisingly the group of second largest firms (100-259 employees) has the lowest share of products and service new to the market, while the size group of firms with less than 50 employees has a larger than average share of firms reporting products or services new to the market.

Again, compared to CIS, our respondents show much larger shares than the average innovative firm. More than twice as many firms in our sample have introduced products/services or processes that were new to the market. Especially the small firms stand out as having high shares of radical innovations. One possible explanation for the 'success' of the small firms in our sample, may be that a new or improved product, process or service will have a proportionally more profound effect in a firm with a small product portfolio, than in a large well established firm offering a wide array of goods and services.

Innovation behaviour

How do firms in our sample innovate? Do they use other inputs than the average Norwegian firm?

Innovation activities are defined as research and development (both intramural and extramural), acquisition of machinery, equipment and other external technology, industrial design, training and marketing linked to technological innovations.

We map what kind of innovation activities firms invest in, in order to see to what degree firms use internal research and development as an instrument in their innovation activities. In this section we calculate the share of innovation costs used on different innovation activities. We also look closer at RCN's role with regard to the share of total company innovation costs.

Table 3.1.7. Share of firms that take part in different innovation activities in 2000. (N=101, N=1351).

Types of innovation activity	Number of firms	Share of firms that have answered 'yes' (%)	Share of firms that have answered 'yes' (%) CIS Norway 1997
Internal research and development	108	95	44
External research and development	101	76	28
Training directly linked to technological innovations	98	73	57
Market introduction of technological innovations	96	61	33
Acquisition of machinery and equipment	97	49	26
Industrial design, other production preparations for technologically new or improved products	102	38	44
Acquisition of software and other external technology	101	37	22

The table above gives the share of firms that have taken part in different innovation activities in the year 2000, regardless of the amount used on the different activities. Close to all firms that have answered this question, have carried out internal R&D (95 percent). More than two thirds of the firms (76 percent) have had R&D carried out externally – i.e. by others – suggesting well-developed linkages to external R&D providers.

The table shows that 73 percent of the firms have carried out training directly linked to technological innovations, and 61 percent have taken part in market introduction of technological innovations. The table indicates that besides R&D activities, firms take part in a variety of other innovation activities as well.

Compared to the CIS sample our RCN contract partner sample has a higher share of firms engaged in all types of innovation activity, besides industrial design. The difference is especially clear in the share of firms taking part in R&D activities. More than twice as many contract partner firms take part in internal R&D compared to the CIS sample. The share of contract partner firms with external research and development is almost three times higher.

There are differences between sectors (industry, services, other) in the share of firms that take active part in innovation activities. Firms belonging to the industry sector are – to a larger extent than firms in the service sector – involved in activities like 'Acquisition of machinery and equipment', 'Acquisition of software and other external technology' and 'Industrial design, other production preparations for technologically new or improved products'. This implies that firms belonging to different sectors of the economy emphasis different inputs into the innovation process.

Table 3.1.8. Share of firms that take part in different innovation activities, by size. (N=104, N=1351).

Innovation activities/Size of firms	0-19	20-49	50-99	100-249	250 +	Total
Internal research and development	91	100	93	100	100	95
External research and development	64	73	100	78	88	76
Acquisition of machinery and equipment	35	47	55	88	71	50
Acquisition of software and other external technology	20	53	36	60	53	37
Industrial design, other production preparations for technologically new or improved products	26	40	62	50	41	38
Training directly linked to technological innovations	67	71	60	100	82	72
Market introduction of technological innovations	67	50	63	40	65	61

There are also differences between size groups of firms and innovation behaviour. The differences lies not so much in the share of firms actively involved in internal research and development, as even the smallest firms have a large share of companies engaged in internal and external R&D.

However, the smallest size group (0-19) have a lower share of firms actively involved in acquisition of machinery and equipment and of software and other external technology and design than larger firms, suggesting that the size of firms is decisive to what kinds of innovation activity they take actively part in. Small firms have resource constraints in relation to the level and degree of innovation activities that can be carried out.

Table 3.1.9.Distribution of average shares of innovation costs used on different innovation activities in 2000. (N=104).

	Internal research and development	External research and development	Acquisition of machinery and equipment	Acquisition of software and other external technology	Industrial design, other production preparations for technologically new or improved products	Training directly linked to technological innovations	Market introduction of technological innovations
Survey	53	19	10	2	3	6	7
CIS	26	7	36	10	7	9	4

In average the contract partner firms in 2000 used 53 percent of total innovation costs on *internal* R&D activities. If we include the amount firms used on *external* R&D, the distribution shows that the firms in average used 72 percent of total innovation costs on R&D activities.

Even though the firms to a large degree are involved in several innovation activities, the R&D component takes the largest share of the innovation budget. Acquisition of machinery and equipment accounts in average for 10 percent of innovation costs, while market introduction of technological innovation only accounts for 7 percent.

Compared with the CIS data, the RCN contract partner firms use twice as much of total innovation costs on internal R&D activity, and almost three times as much on

external R&D. The contract partner firms use a relatively low share of total innovation costs on acquisition of machinery and equipment compared to the 'average' innovative firm.

However, there are differences between sectors in how the companies distribute their innovation budget. Service firms use less money on acquisition of machinery (2.6 percent in average) than the industry sector as well as the rest category ('other'), but they use a larger average share on market introduction of technological innovations (9.6 percent). There is no particular difference between the sectors in the average share spent on internal or external R&D.

Table 3.1.10 Distribution of average shares of innovation costs used on different innovation activities in 2000, by size of firms. (N=104).

	Internal research and development	External research and development	Acquisition of machinery and equipment	Acquisition of software and other external technology	Industrial design, other production preparations for technologically new or improved products	Training directly linked to technological innovations	Market introduction of technological innovations
0-19	54.5	20.7	4.3	2.2	3.3	6.0	9.1
20-49	57.1	12.8	9.3	2.8	1.6	7.0	9.4
50-99	48.1	21.7	14.6	3.4	5.4	4.6	2.3
100-249	48.1	21.0	20.3	2.4	1.2	3.0	4.0
250+	54.9	12.2	17.7	3.3	1.4	5.9	2.1
Total	53.6	18.3	9.7	2.6	2.9	5.7	6.8

There is also little difference between the size groups regarding the average spending on internal R&D. Looking at external R&D, the samples containing 20-49 employees and 250+, have lower average shares than the other size groups. The group of largest firms (more than 100 employees) use a greater share of their innovation costs on acquisition of machinery and equipment than smaller firms. Firms with less than 50 employees use a relatively high share of innovation cost on market introduction of technological innovation, these investments being among the three most important innovation activities.

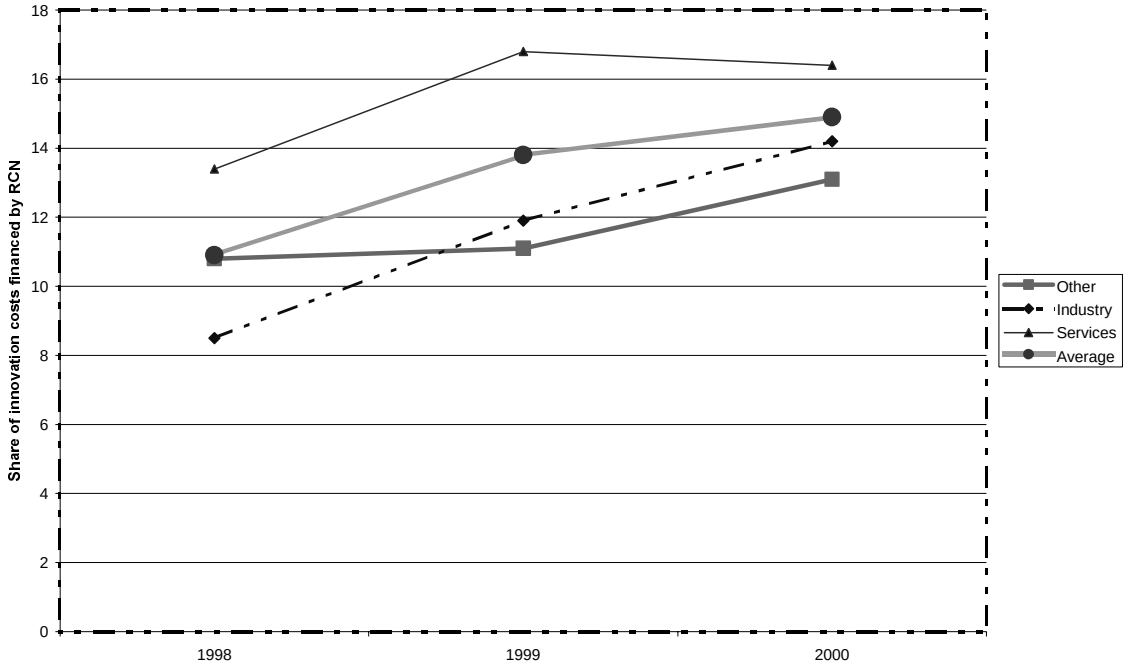


Figure 3.1.1 Average share of total innovation costs financed by RCN in the years 1998, 1999 and 2000, by sector (N=133,138,147).

The figure above shows the average share of innovation costs financed by RCN in the years 1998, 1999 and 2000.

Looking at all the contract partners, there has been a rise in the proportion of innovation costs financed by RCN from 1998 to 2000. In 1998, RCN in average financed 11 percent of firms total innovation costs; in 1999 the share was close to 14 percent. In 2000, RCN's share of contract partner firms' total innovation costs had risen to 15 percent.

The largest relative growth in RCN's share of funding, has taken place among contract partner firms belonging to the industry sector. The share has risen from 8.5 percent in 1998 to 14.2 percent in 2000. RCN funding constitutes a relative larger share of service firms' innovation cost, compared to the 'other' sector. For the service sector, the share of RCN funding has slightly fallen the last two years. This is in sharp contrast to the growth of the industry sector, and the residual sector of 'other' from 1999 to 2000.

Table 3.1.11 Share of total innovation costs financed by RCN in the years 1998, 1999 and 2000, by size of firms (N=133,138,147).

	1998	1999	2000
0-19	12.3	17.4	18.0
20-49	11.0	14.2	12.6
50-99	6.6	10.2	15.0
100-249	9.3	7.3	13.1
250+	9.1	6.3	7.1
Total	10.6	13.3	14.6

The table above shows that RCN funding as share of total innovation cost is higher for the smallest firms, especially for firms with less than 20 employees, suggesting that RCN plays an important role for small firms' ability to engage in innovation. For this size group, RCN's share of total innovation costs has during the last three years risen from 12 percent in 1998 to 18 percent in 2000. Firms with more than 250 employees had less than half the average RCN funding in the years 1999 and 2000 (7.1 vs. 14.6 percent and 6.3 vs. 13.3 percent), suggesting that larger firms have access to alternative sources of funding.

Innovation collaboration

Another objective for User oriented research is to exploit potentials in international markets. By looking at firms' innovation collaboration behaviour, we can categorise them according to the type of partners and where these are located. By doing this we can figure out to what extent firms are interacting with international collaborators in their innovation activity, and possibly link them to international markets.

It should be noted that we do not know whether this innovation collaboration is directly linked to the RCN funded research project, but the relationship can give an indication of what kind of innovation networks these firms take part in.

Firms' collaborative behaviour is measured in terms of engagement in innovation co-operation in the year 2000 with any of the types of partners listed. We do not take into account the companies' number of co-operative actions with the various kinds of partners. Further, we get no indication on how the firms value their collaborative partners, or whether the innovation collaboration projects are successful.

Table 3.1.12 Share of firm reporting innovation collaboration with different partners in the period 1998-2000,by sector. (N=155).

	Survey			CIS		
Collaboration partners:	Industry	Services	Other	Industry	Services	Other
Other companies within the same enterprise	65	48	44	35	44	39
Competitors	23	39	47	8	10	24
Customers	87	95	88	25	25	29
Consultancies	72	83	75	14	20	31
Suppliers of equipment	81	71	96	26	39	46
Universities and colleges	78	82	90	15	11	32
Public or private (non-profit) research institutes	86	84	92	18	13	33
Share of firms with innovation collaboration, total	100	99	100	47	58	65

Close to all contract partners have taken part in innovation collaboration in the three-year period from 1998 to 2000. The largest share of firms in each sector have had innovation collaboration with customers, universities/colleges and R&D institutes as well as suppliers of equipment.

The most common type of co-operation partner by all the sectors is customer firms. 95 percent of the service firms report this kind of innovation collaboration. This is not surprising given that service products often are customer specific and requires adjustments and tailor-made solutions. New innovations in the service sector often emerge in co-operation between the service firm and its customers.

The 'other' sector shows particularly high shares of co-operation with the scientific community and with suppliers of equipment.

Compared to the CIS sample, the contract partner firms are fare more involved in innovation partnerships, and their collaboration is to a larger degree oriented towards the scientific community. The CIS study shows that the largest shares of firms have innovation collaboration with other companies belonging to the same enterprise, or with customers or suppliers of equipment.

Table 3.1.13. Share of innovative firms collaborating with partners located within and outside Norway in the period 1998-2000, by sector. (N=155).

	Survey			CIS		
Collaboration partners:	Industry	Services	Other	Industry	Services	Other
Partners in Norway	97	99	96	43	53	64
Partners in EU	66	60	54	22	20	27
Partners outside EU and Norway	43	34	29	9	10	15
Share of firms with innovation collaboration, total	100	99	100	47	58	65

The table above shows the location of the innovation collaboration partners. Almost all contract partner firms have joined forces with Norwegian partners. In the industry sector two thirds of the respondents have collaborated with a partner located in the EU, and 43 percent with a partner outside EU/Norway, suggesting extensive use of foreign partners. Innovation collaboration with foreign partners seems to be complementary to collaboration with Norwegian partners.

The shares for the service sector is slightly lower, but even here a significant portion of the firms report collaboration with international partners, – the percentage being much higher than for the average Norwegian firms found in the CIS.

3.1.3 Questions related to the specific RCN funded project

The next section focus on the specific projects for which the contract partners have received funding from the RCN. The main question is whether firms experience any direct or indirect effect of this kind of funding, and whether the RCN funding is characterised by high or low additionality.

45 percent of the project leaders report that the relevant projects have come to an end. There are only minor differences between the sectors as regards this percentage, but significant differences connected to the size of firms.

Table 3.1.14: Share of firms that reported that the projects were already finished, by size. (N=151).

Size of firm	0-19	20-49	50-99	100-249	250+	Total
Share of projects that were not finished (%)	47.2	41.7	77.8	83.3	44.0	52.3
Share of projects that were finished (%)	52.8	58.3	22.2	16.7	56.0	47.7

Out of the 158 that answered this question, we have the size distribution for 151 firms. The table shows that among firms with 50-99 and 100-249 employees 78 and 83 percent of the firms have yet not finished the projects. When analysing the effects of the projects, we will have to keep this in mind.

More than half the projects reported by contract firms were collaboration projects (53 percent). Contract partner firms belonging to the service sector report higher shares of collaboration projects than the industry sector (61 vs. 42 percent).

How then do firms finance their R&D projects?

Table 3.1.15 Firms' financing of the specific project, by sector. (N=149).

Sources of finance	Industry	Services	Other	Total
Participating firms' own finance	58.5	46.2	49.6	51.9
Participating firms' purchase of R&D from R&D institutes	4.4	4.1	2.1	3.8
The R&D institutes own finance	1.5	7.0	4.7	4.3
RCN	32.6	36.0	34.4	34.3
Other public finances (SND, Ministries, etc.)	0.8	3.4	2.9	2.3
Other public finance	0.6	1.7	2.3	1.4
Other Norwegian firms' purchase of service from collaborating partners in the project	0.1	0.2	3.8	0.8
Finance from foreign firms	1.1	0.0	0.0	0.5
Other foreign finance	0.2	0.3	0.0	0.2
Other sources	0.2	1.1	0.2	0.5
Number of answers	61	61	27	149

On average the participating firms finance 52 percent of the total costs of the R&D project themselves. There are some differences between sectors in that the industry sector seems to finance larger shares than the 'other' segment and the service sector. Approximately one third of the project funding comes from the RCN. There is only relatively marginal funding from other non-company sources.

The purchase of R&D from research institutes differs between sectors, and this purchase is more important for the service industry than for 'Other' or the industry sector (7 percent, 4.7 and 1.5 percent respectively). The service sector and the residual sector ('Other') report some funding of parts of the project from other public sources than RCN. This is less important for the industry sector (3.4 and 0.8 percent respectively).

Table 3.1.16: Firms' financing of the specific project, by size. (N=144).

Sources of finance	0-19	20-49	50-99	100-249	250+	Total
Participating firms' own finance	47.7	52.9	55.0	57.1	59.5	52.1
Participating firms' purchase of R&D from R&D institutes	4.0	4.5	5.6	0.0	3.8	3.9
The R&D institutes own finance	5.1	3.4	3.3	2.9	2.2	4.0
RCN	36.0	32.7	33.1	34.6	29.7	34.0
Other public finances (SND, Ministries, etc.)	2.8	2.8	1.0	5.0	0.8	2.5
Other public finance	0.6	3.3	2.0	0.3	3.8	1.7
Other Norwegian firms' purchase of service from collaborating partners in the project	1.7	0.0	0.0	0.0	0.0	0.8
Finance from foreign firms	1.0	0.0	0.0	0.0	0.0	0.5
Other foreign finance	0.5	0.0	0.0	0.0	0.0	0.2
Other sources	0.5	0.2	0.0	0.0	0.2	0.3
Number of answers	69	22	17	12	24	144

Regardless of company size, the contract partners' own funding coupled with the RCN contribution finance the largest part of the R&D projects. The share of the firms' own financial contribution to the R&D projects rise with the size of the firms.

Firms with more than 250 employees finance close to 12 percentage points more of the R&D project by themselves compared to the firms with more than 20 employees. The institute sector seems to be more important for smaller firms than for larger firms, although its share is relatively small.

The smallest firms (less than 20 employees) get funding for their project from a more diverse set of financial sources than larger firms. They report support or funding from other Norwegian firms, foreign firms, other public finance sources, and more. This might suggest that small firms' lack of internal resources for R&D push firms to seek external partners for funding. However, it must be noted that the shares are very low.

Results of the project as seen from the contract partner firm
This section will look at how the project leaders perceive the results and effects of the project specifically for the contract partner firm.

Table 3.1.17 Number of industrial results for the contract partner, absolute number and average result per project. (N=143)

Industrial results	Number	Average number of results per project
New patent applications	51	0.3
Licensing contracts	18	0.1
New prototypes	87	0.6
New products/services	84	0.6
New processes, methods, models	95	0.6
Company start ups	13	0.1
Total	348	2.4

The contract partner firms (143) report that their specific projects have resulted in a diverse set of industrial results (patent applications, prototypes, products and services etc.). Obviously, the real value of the various types of individual 'results' may vary tremendously. These numbers therefore make sense only on an aggregate level.

Altogether contract partner firms report that the projects have given birth to 348 different industrial results; in average this gives more than 2 industrial results per project. Less than half of the contract partner firms report some kind of industrial results (42 percent). The total number of new processes, methods and models in contract partner firms is 95 (0.6 per project in average), followed by 87 (0.6) new prototypes and 84 (0.6) new products/services. There have also been 13 company start-ups as a result of the projects. There are only small differences between industries and company sizes as regards types of industrial results reported.

As mentioned above, only half of the projects had come to an end at the time of the survey. Still, firms that have finished the project report no more results in average than those that have not yet finalized the undertaking.

There is no clear difference between firms that have taken part in a collaboration project and those that have not in terms of average results from the projects. However there are differences in the types of results from collaborative and non-collaborative projects. A larger share of the collaborative projects report company start-ups and licensing contracts (the numbers are, however, small). Contract partner

firms that have not been collaborating in the specific project, report a larger amount of new prototypes.

Table 3.1.18: Number of scientific results by types, for the contract partner, absolute numbers and average result per project. (N=114).

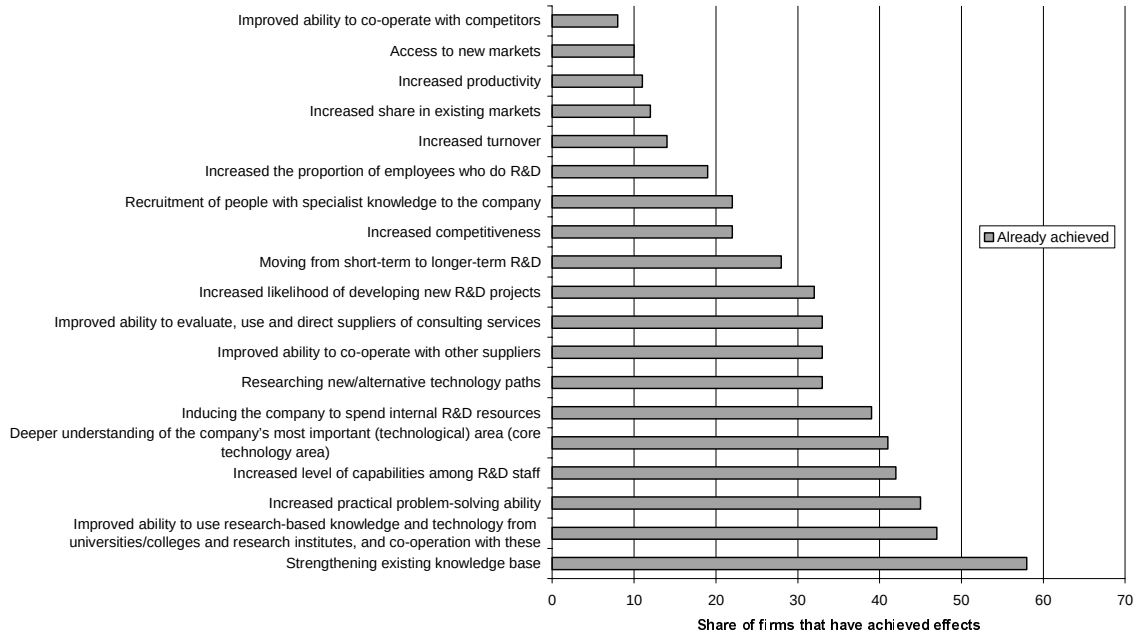
Scientific results	Number	Average number of results per project
Completed doctorates	1	0.0
Articles in refereed scientific journals	12	0.1
Reports or articles in the professional/trade press	79	0.7
Books etc	6	0.1
International conference papers	82	0.7
Total	180	1.6

114 of the contract partner firms report that they have received some scientific results from the project. By those companies that have answered this question, in average 1.6 scientific results have been reported. There has been reported 82 international conference papers (0.7 in average per project), and 79 reports or articles in professional journals/trade press (0.7). Firms that have taken part in a collaboration project are more likely to report that they have made a report or article. Projects that have been terminated in general report more scientific results than those that are not yet finished.

Effects of the project

The figures below show the distribution of firms that have reported on different effects. Firms are asked to fill inn whether they had already achieved the effect, whether they expect the effect within 2-3 years or whether the effect is irrelevant (exclusive categories). The two figures below show the samples that report on already achieved effects and effects expected in the future only.

Figure 3.1. 2. Share of contract partner firms that have achieved effects as a result of the project. (N=159).



We asked the contract partner firms how they would characterise the effects already achieved as a result of the project. The figure above gives the share of firms that have reported on the different effects.

More than half the firms (58 percent) report that through the R&D project they have strengthened their existing knowledge base, and that their ability to use the knowledge infrastructure has improved (47 percent). Firms also report on having increased their practical problem solving ability (45 percent). Approximately 40 percent of the firms report that the project has increased the level of capabilities among R&D staff, and that they through the project have got a deeper understanding of the core technology area of the firm.

A large proportion of the firms seems to have achieved a competence upgrade by taking part in the project. Few firms report on 'economic effects' of the project (such as increased turnover and productivity and access to new markets), a result that is not surprising given that many projects are still in their early phases, and that the effects of R&D often take time to materialise.

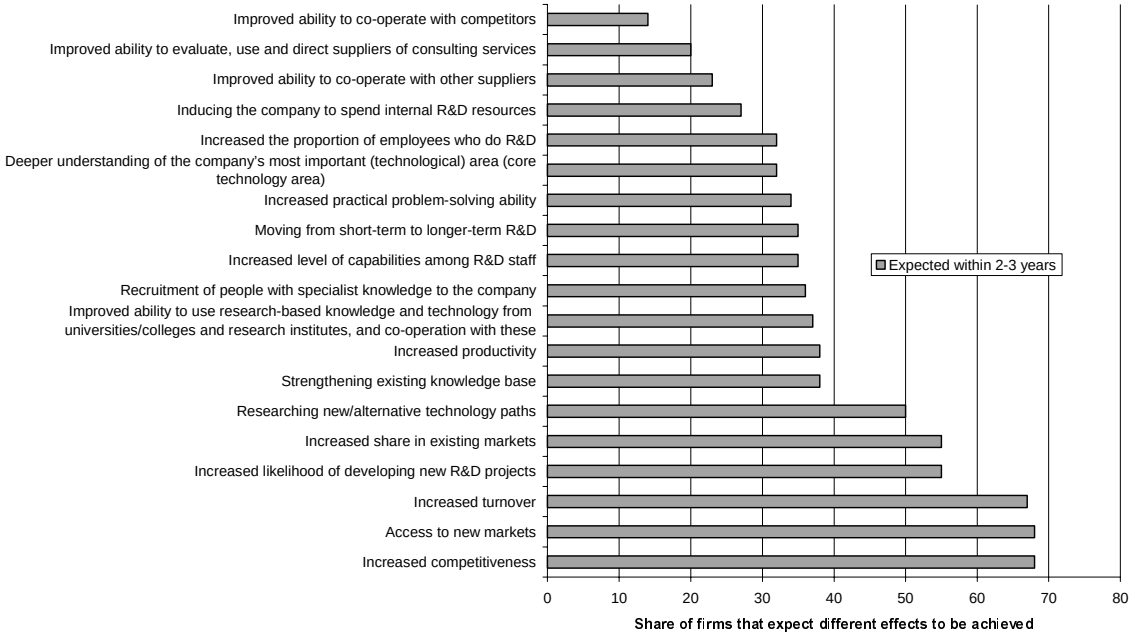


Figure 3.1.3 Share of contract partner firms that expect different effects to be achieved within 2-3 years as a result of the project. (N=159).

We also asked firms what kinds of effects they expect to achieve from the R&D project within 2 to 3 years from now. Close to 70 percent of the firms now expect to achieve increased competitiveness, access to new markets, and increased turnover. Contract partner firms have positive expectations to the economic effects of the projects.

More than half the firms expect that they will increase the likelihood of developing new projects and new/alternative technology paths for the firm. This might indicate that RCN funding have had an effect on the firm behaviour in that they are more likely to engage in R&D activity in the future, thus indicating that RCN funding do result in behavioural additionality.

Results of the whole project evaluated by the contract partner firm

As mentioned earlier, more than half of the projects have been collaboration projects. We asked the project leaders if he or she, *on behalf of the project as a whole*, could evaluate different effects of the projects. (We must keep in mind that we are not asking them to evaluate the participating partners themselves here – this is done in another survey). We use the same measures of effects as for the contract partner firms above.

Table 3.1.19: Number of industrial results for the project as a whole, absolute number and average result per project[19]. (N=158)

Industrial results	Number	Average number of results per project
New patent applications	45	0.3
Licensing contracts	13	0.1
New prototypes	89	0.6
New products/services	205	1.3
New processes, methods, models	226	1.4
Company start ups	19	0.1
Total	597	3.7

When the project leaders evaluate the industrial results for the project as a whole, the number of industrial results rise from 348 to 597. This indicates that several industrial results can be attributed to the collaboration partners, and not only to the contract partners firms.

The average number of industrial results that come from each project is close to 4, and the industrial results most often mentioned are new products/services or processes, methods or models. The average share of these kinds of industrial results rise from 0.6 when evaluating the contract partner only, to 1.3 and 1.4 when the collaboration partners in the project are also taken into consideration.

It is especially the contract partner firms with 20-49 employees that report large numbers of new products/services and processes, methods and models from collaboration partners.

Distributed by sector it is the industry firms that report most new products/services and processes, methods and models.

Table 3.1.20: Numbers of scientific results by type, for the whole project, absolute number and average result per project. (N=111).

Scientific results	Number	Average number of results per project
Completed doctorates	17	0.2
Articles in refereed scientific journals	35	0.3
Reports or articles in the professional/trade press	114	1.0
Books etc	5	0.0
International conference (papers)	142	1.3
Total	313	2,8

[19] The numbers in the first rows are lower than the ones reported when the contract partner were to evaluate industrial effects for the contract partner firms only (se table 5.2.20). This means that some respondents when asked to evaluate the whole project only have given answers on behalf of the collaboration partners.

When evaluating the whole project, the project leaders report that there have been 313 scientific results from 111 projects. If we compare this result with the one the project leader reported for the contract partner only, the average rises from 1.6 to 2.8 scientific results per project, suggesting that collaboration partners also experience substantial positive effects from the User oriented project.

The scientific results that score the highest are international conference papers and reports or articles in the professional/trade press. These are the types of scientific results that increase most in absolute numbers, compared to the results for the contracting partner only.

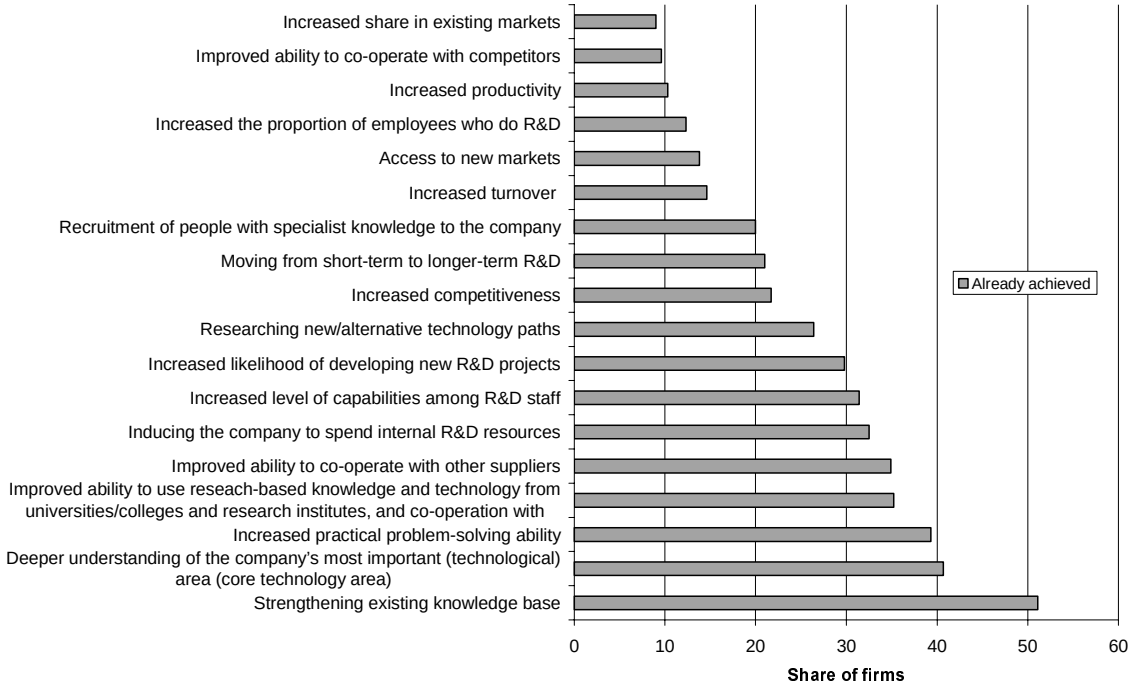


Figure 3.1.2 Effects that have already been achieved as a result of the project, as evaluated by project leaders (share of project leaders considering the relevant factors important). (N=92).

We asked the project leaders to evaluate effects already achieved, not only for the contract partner firm but for the projects as a whole. The largest share (51 percent) reported a strengthening of the existing knowledge base of the firms and a deeper understanding of the companies' most important (technology) areas (41 percent).

As a result of the project, many of the participating firms also report an improved ability for practical problem solving (39 percent), and for using research-based knowledge and technology from universities, colleges and institutes and to co-operate with the scientific community (35 percent).

The R&D competence of the participants is deemed to have improved as a result of many of the projects. Close to one third of the projects report increased spending on

internal R&D, increased level of capabilities among R&D staff and increased likelihood of developing new R&D projects.

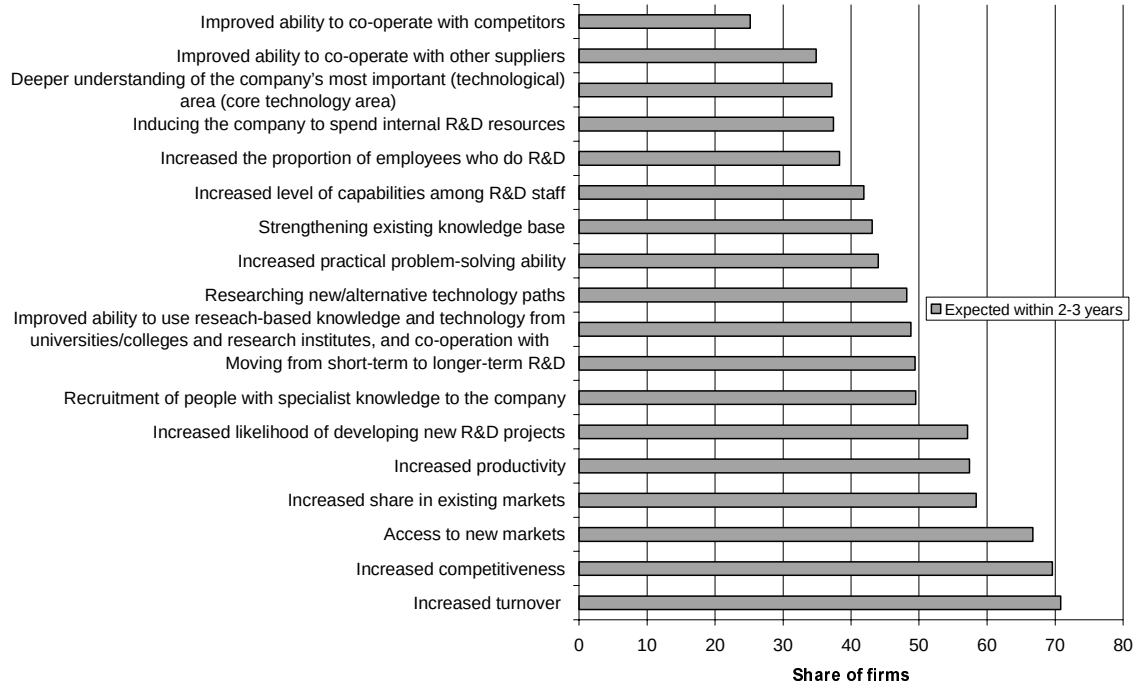


Figure 3.1.5 Effects expected within 2-3 years as a result of the project (Share of project leaders that on behalf of the project as a whole consider the alternatives relevant). (N=92).

70 percent of the project leaders report that the firms of the project expect increased turnover and competitiveness as a result of the project. Other effects reported by a large number of firms are access to new markets and increased productivity.

It is expected that the firms will recruit new people to the company as a result of the project. This aspect can be linked to factors like 'the strengthening of the knowledge base' and to 'a deeper understanding of companies' core area'.

Furthermore, a large number of firms are expected to experience competence building in the form of longer term R&D, improved ability to use science based knowledge, to co-operate more with the scientific community and to explore new or alternative technology paths. This applies not only to the contract partner but also to the project as a whole.

Table 3.1.21: Shares of contract partner firms reporting that different forms of knowledge transfer has been very important in collaboration with partners in the project. (N=103).

Types of knowledge transfer	Number of firms	Share of firms answered 'very important'
Meetings/presentations	103	44
Written documentation such as reports, specification, technical drawings etc.	103	44
Practical work	103	41
Delivery of prototypes or finished product components	102	32
Exchange of personnel	98	11
Training schemes or courses	97	10

In the collaboration projects meetings/presentations and written documentation such as reports, specifications, technical drawings etc. are considered to be very important modes of knowledge transfer by the largest share of firms. Practical work is reported to be very important by 41 percent of the contract partner firms.

One third of the firms report that deliveries of prototypes is a very important form of knowledge transfer, while only one tenth of the firms report that exchange of personnel or training schemes or courses have been of equal importance. This might suggest that partners that can contribute with complementary knowledge in the project set the project theme.

3.1.4 The role of RCN

In this section we are interested in finding out what role RCN plays vis-à-vis the firms. Are the contract partner firms pleased with the way the RCN play its role?

Table 3.1.22: Share of firms that after the end of the project report RCN's help (N=74).

Has RCN helped…	Yes	No	Uncertain	Total
…to develop the project further?	13.2	82.9	3.9	100.0
…to exploit opportunities available from other business and technology support agencies(e.g. SND, The Export Council)?	6.7	86.7	6.7	100.0
…to spread the scientific results from the project	21.6	58.1	20.3	100.0

We asked the firms that had taken part in finished projects whether RCN had done any follow-up work related to the projects. As the table above indicates, large shares of contract partner firms answer 'no' to the question on whether RCN has created links to other business or technology support agencies, or whether it has taken initiatives in order to develop the projects further.

When it comes to diffusing the scientific results of the project, 22 percent of the contract partner firms report that RCN has played a positive role.

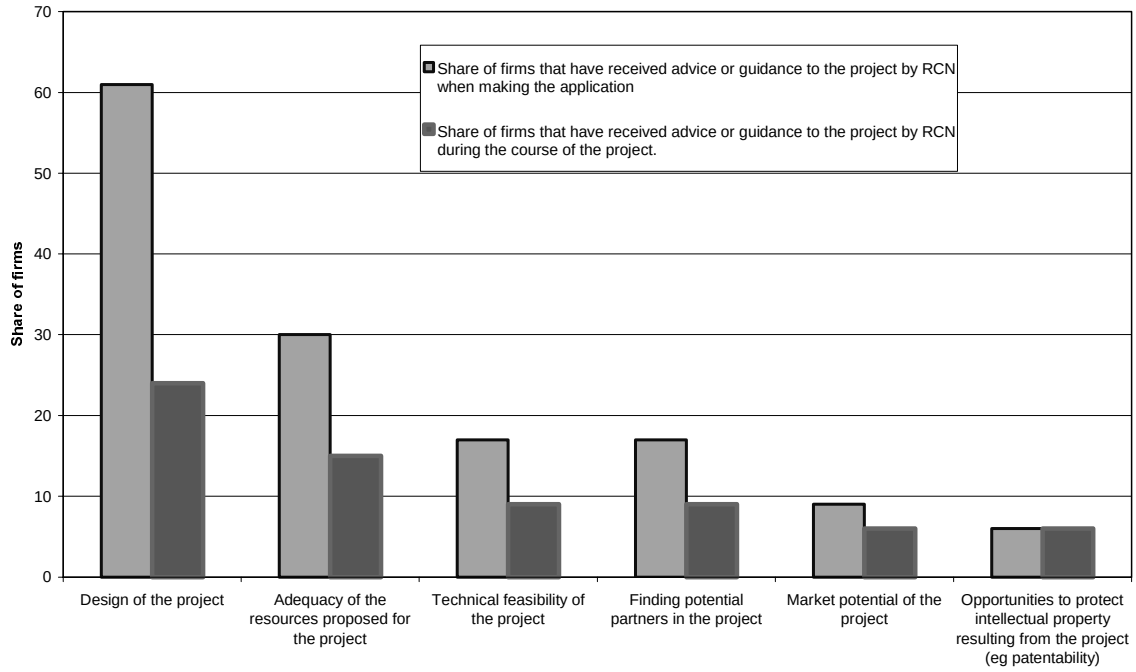


Figure 3.1.6: Share of firms that have received advice or guidance to the project by RCN when developing the application (N=155), and during the course of the project (N=135).

The figure above shows the percentage of firms reporting that RCN has provided various types of advice or guidance to the project, either at the time the firms were writing the application or during the project period. The table shows that RCN play a more active role in the development phase of the application. A much smaller proportion of firms report that the RCN play such a role during the course of the project.

The largest share of firms reports that RCN provided help with designing the projects (61 percent), and gave advice on whether there were enough resources available for the projects (30 percent report this). Few firms report that RCN has played a role in finding partners or in giving advice/guidance on the technical feasibility of the project. Nor does it seem that the Research Council has given much advice on the market potential of the project.

Table 3.1.23: Share of project leaders that on behalf of the project as a whole, evaluate RCN's help with establishing dialogue and networks with external actors in connection to the project. (N=161).

	Very dissatisfied	Neutral	Very satisfied	Not relevant	Total
Research institutes	17,4	19,3	11,8	51,6	100
Universities and colleges	18,6	16,8	7,5	57,1	100
Other companies	14,3	18	3,7	64	100
Public sector	18,8	12,5	3,1	65,6	100
Consultants	16,8	16,8	1,2	65,2	100

We asked the project leaders in the contract partner firm if he/she, on behalf of the project as a whole, could state how satisfied they are with RCN's help in establishing

dialogue and networks with external actors. As can be seen from the table above, a large share of project leaders answer that this form of help is not relevant. This could be a result of companies not seeking this kind of help, or that there are few meeting places between RCN and the participant firms that enable this form of dialogue or network building. As can be seen from figure 3.1.6 the RCN at this point seems to have played a minor role during the course of the project.

When RCN establish networks between project participants and external actors, participants are most satisfied with the dialogue and contacts with the scientific community, including universities and research institutes. RCN can to some extent be seen as a bridging institution between the business community and the research institutions. However, even though the RCN seems to be most successful creating linkages towards the scientific community, the levels of satisfaction is quite low and suggest that even this role can be improved. The RCN role played towards other companies, the public sector and consultants is marginal.

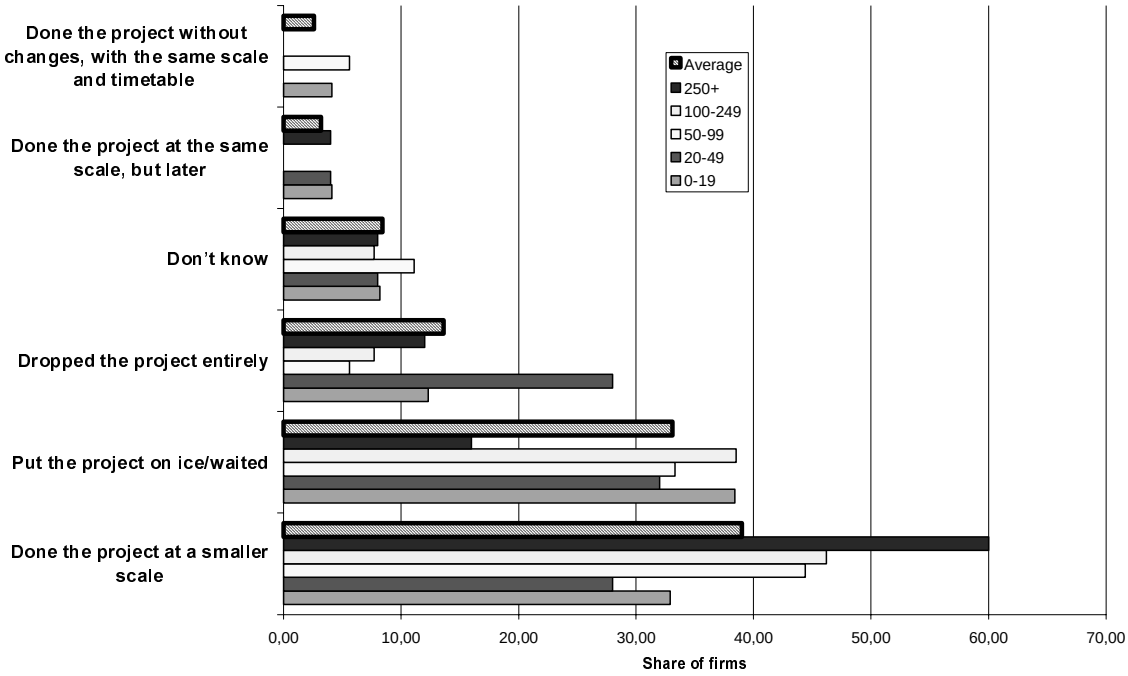


Figure 3.1.7: Share of firms that report on 'what would have happened to the research project if RCN had not funded it', by size. (N=154).

We asked the project leaders in the contract partner firms what would have happened to the projects if RCN had not provided financial support, and what level of additionality characterise the funding given by RCN. We would like to know if the RCN support is of vital importance to the accomplishment of the projects (high additionality). Will the firms carry out the projects regardless of the RCN contribution (low additionality), or is the additionality somewhere in between?

As can be seen from the figure, 38 percent of firms report that they would have carried out the project anyway, but on a smaller scale. The size of the firm is, however, important.

60 percent of firms with more than 250 employees report that they would have implemented the projects anyway, but on a smaller scale. For firms with less than 50 employees this share is around 30 percent.

The second largest group of firms say that they would have put the project on ice (34 percent). Of the companies responding that the project would have been postponed or put on ice, close to 40 percent of the firms with less than 20 employees and firms between 100-249 employees say so. The fact that the firms state that the projects would have been put on ice may have various interpretations. One interpretation is that the projects would have been accomplished regardless of RCN support, but that lack of resources at the time, forces the firms to postpone the project for a while. Another interpretation is that the firms would have been forced to put the project on hold until they got RCN support.

Note that only 16 percent of the largest firms (250+) report that they would have put the project on ice/waited if there had been no RCN funding.

Only 13 percent of the firms say that they would have dropped the project entirely if RCN had not funded the project. For this group of firms RCN funding clearly is crucial, and the additionality of the RCN support must be characterised as high.

There are differences regarding the size of firms. As many as 28 percent of firms with 20-49 employees report that they would have dropped the project entirely, suggesting that this is a group of firms very dependent on public R&D funding. On the other end there is also a small group of firms that report that the projects would have been carried out regardless of RCN funding (2.6 percent).

When distributing the contract partner firms by sector there are no significant differences between the sectors as regards how they respond to this particular question.

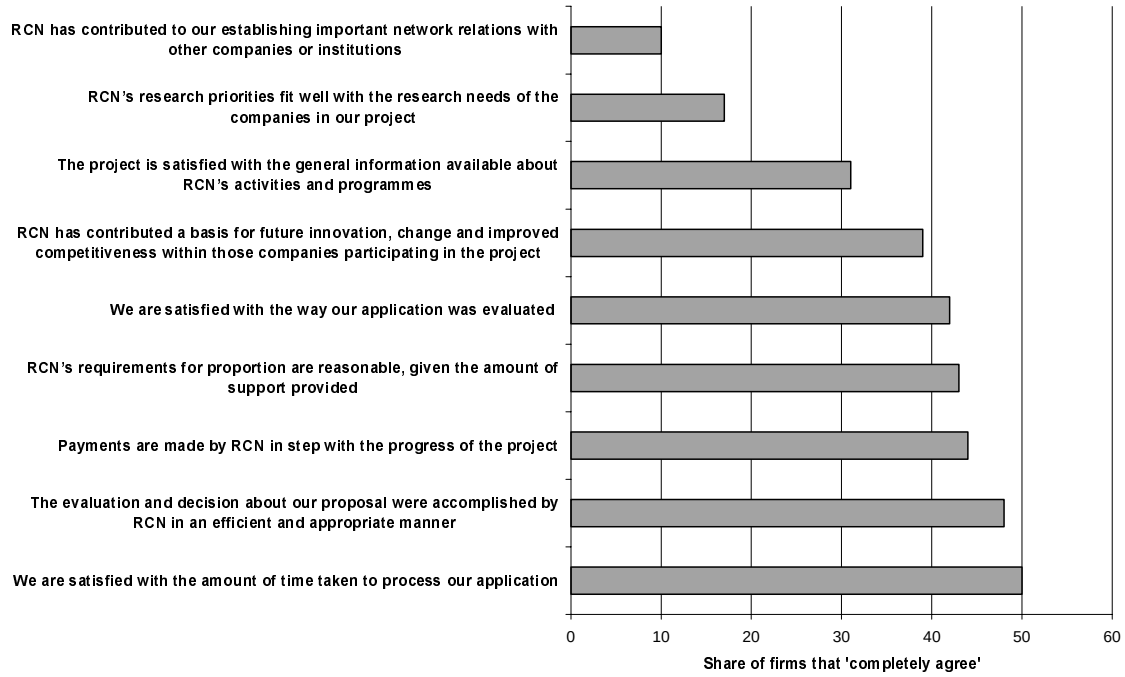


Figure 3.1.8: Share of firms that 'completely agree' with the following statements. (N=169).

We asked the contract partner firms how well various statements characterize their experience with RCN. The figure above report the share of firms that completely agree with the statements given.

Half of the respondents report that they totally agree with the statement that they are satisfied with the amount of time used by the RCN to process the application, and that the evaluation and decision of the proposal was accomplished in an efficient and appropriate manner (48 percent). In general firms seem satisfied with the way RCN process and evaluate proposals.

Only 10 percent of the firms agree to the statement that RCN contributed to networking (actually, as many as 65 percent disagreed with this statement). Moreover, only 17 percent of the firms agree to the statement that RCN's research priorities fit well with the research needs of the companies in the project.

Open question

At the end of the questionnaire, we posed an open question, asking the project leader to state – on behalf of the project as a whole – what he or she thought RCN could do to improve its 'offer' to its customers.

Firstly, many firms find that the RCN's share of funding is to low, that there are too many programs, resulting in too small amounts of money to each partner. Looking closer at the responses, two main categories emerge. Firstly there are comments that relates to the application procedure, secondly there are comments related to the RCN's role as bridge builder /networker.

Many firms do report that they are satisfied with the way RCN handles the application procedure. However, some firms report that they feel the application procedure takes too much time. Small firms say they have problems with actually writing the application, which may indicate a need for more advice and information. Moreover, small firms find it too time consuming to apply for money from RCN; time and money being scarce resources.

Some firms would prefer a higher competence level among people working in RCN, and among participants in program commissions. Others argue RCN should work harder to be a trendsetter through their research priorities as shown in the research programs.

Many firms wish that RCN would take a more active role in establishing and initiating collaboration within and between branches of industry for the purpose of R&D collaboration. When the Norwegian universities, colleges and research institutes lack the competences needed, some firms feel that RCN should bring them in contact with scientific communities abroad.

Furthermore, some firms want RCN to play a more active role in bringing the finished project over to other public institutions (such as SND), in order to help them continue projects started with the help of RCN funding.

Firms also report a need for assistance to bring finished R&D projects closer to the market.

3.1.5 Summary of the contract partner firm survey

Half the contract partner firms have less than 20 employees, and the largest share of contract partner firms (60 percent) are to be found in central areas of Norway. Compared to the distribution of all firms in Norway, our sample has a lower share of small firms and an overrepresentation of industry firms.

Not surprisingly, almost all respondents have taken part in innovation activity the last three years, suggesting that this is a group of firms having implemented innovation strategies. The innovative firms show good results from their innovation activities; firms reported that on average sales in 2000 consisted of 64 percent new products or processes. The smallest firms (less than 50 employees) had the largest shares of innovation in sales.

As many as 72 percent of the contract partner firms report that they have introduced products or services not only new to the firm, but also new to the market. Compared to the CIS survey, the contract partner firms stand out as having larger shares of sales consisting of new or improved products and services, of which many can be considered radically new.

Contract partner firms spend a large share of total innovation costs on R&D, internal or external (commissioned). On average these firms use two thirds of total innovation costs on this research and development activities. In this way the contract partner firms differs from the 'average' innovative firms, which are likely to spend less resources on R&D.

Among our respondents the RCN funding as share of total innovation costs has risen during the last three years. This is especially true for contract partner firms belonging to the industry sector. However, the RCN funding constitutes a larger share of total innovation cost for service firms. The RCN support also makes up a relatively larger share of total innovation costs in small firms compared to large firms.

All our respondents have innovation collaboration. The largest share of firms collaborates with R&D institutes and customers. Our group of contract partner firms differ from 'average innovative firms' (CIS), by the fact that a larger share of firms collaborates with the scientific community. Moreover, a significant number of firms collaborate with partners outside Norway, suggesting extensive international networks, especially among industry firms.

Contract partner firms finance their specific research project mainly by themselves and through RCN support. Small firms use a larger set of financial actors to finance the projects than larger firms. However, the actual amount invested by these alternative investors is very small.

As a result of the specific RCN funded project, project leaders in average report 2 industrial 'results' per project; the largest group reporting new processes, methods, models and prototypes. Similarly project leaders report in average 1.6 scientific 'results' per project, consisting mainly of international conference papers, reports

and articles. Project leaders also find that the collaboration partners in the project have achieved both industrial and scientific results from the specific project. These results are much the same as for the contract partner firms.

In general the project leaders find that all the co-operating firms (the projects as a whole) have already achieved some competence building as a result of taking part in these projects. Close to two thirds expect positive economic results from the project.

Knowledge transfer between the partners in the R&D projects is mainly linked to meetings and presentation and practical work. Few firms report on exchange of personnel or training schemes.

RCN plays a role in the application process, but few firms report that RCN gives any advice or guidance during the project itself. RCN hardly plays any role after the end of the project, neither in terms of further development of the project nor directing the firms towards other public agencies. Few firms report that RCN contributes to network building between the participating firms and other public institutions or actors.

Considering the additionality of the RCN User oriented funding in the contract partner firms of this survey show that only 13% of the respondents would have entirely abolished the R&D project without RCN funding. 38% of the firms would have carried out the project on a smaller scale even if they had not received the RCN support.

In general firms are satisfied with RCN's handling of their application and on RCN's general routines. However, the RCN is given a fairly negative evaluation as a network builder. A relatively low proportion of contract partner firms agree to the statement that RCN's research priorities fit the need in the companies.

3.2 Results from the survey of co-operating partner firms

This part of the chapter will focus on the survey sent out to co-operating partner firms in User oriented projects of RCN. We sent the questionnaire to the managing director or the project responsible person in the company to get the most direct source of information to the RCN project. The firms were asked almost identical questions as the contract partner firms, both as regards general innovation activity of the firm, effects of the RCN project and the role of RCN.

3.2.1 Distribution of respondents

We received 80 answers from the co-operating partners in User oriented projects. The distribution of these companies by size, sector and locality will be presented in the following sections.

Table 3.2.1: Distribution of size of firms (N=80, N=160259).

Number of employees	Number of firms	Share of firms (%)	Number of firms Norway	Share of firms (%) Norway
0-19	31	38,8	141519	88
20-49	10	12,5	12267	8
50-99	11	13,8	4005	3
100-249	7	8,8	1841	1
250+	15	18,8	627	0
Unknown	6	7,5	-	-
Total	80	100,0	160259	100

The above table shows that the largest group of the co-operating partners in the survey are very small firms, with 0-19 employees, followed by the group of very large firms of 250 employees or more.

The fact that the small firms represent the largest share of the sample agrees well with the overall distribution of firms in Norway, although the share is less than half of the real distribution. Close to 90 percent of the firms in Norway are small firms, and the respondent sample shows a share of a little less than 40 percent.

Regarding the large firms, the survey has an overwhelmingly large representation of these companies compared to the overall Norwegian picture of firms. This is not particularly surprising, given that large companies are well-known to be more likely to conduct R&D, and therefore seek funding through RCN. The size groups in between these two extremes show a higher representation in the survey than in the overall distribution of firms, particularly the size groups of firms with 50-99 and 100-249 employees.

Table 3.2.2: Distribution of respondents into different sectors. (N=80, N=160586).

Sectors	Number of firms	Share of firms (%)	Number of firms Norway	Share of firms (%) Norway
Other	7	8,8	8497	5
Industry	31	38,8	28000	17
Services	42	52,5	124089	77
Total	80	100,0	160586	100

The sector distribution of the survey respondents of the co-operating partners is depicted in the table above. Compared to the overall distribution of firms in Norway, the survey respondents are more evenly distributed on sectors, but the overall picture is the same.

Half of the firms in the survey are service firms, compared to three quarters of the overall distribution of firms in Norway. Correspondingly the survey respondents show a much larger share of industry firms than the overall distribution. Almost 40 percent of the companies in the survey are industry firms compared to less than 20 percent in the overall distribution. The survey of co-operating partners of User oriented projects therefore has an under-representation of service firms and an over-representation of industry firms. This is in line with the sector distribution of contract partner firms that was dealt with in an earlier section.

Table 3.3.3: Distribution of respondents into parts of the country. (N=75, N=161367).

Parts of the country	Number of firms	Share of firms (%)	Number of firms Norway	Share of firms (%) Norway
Østlandet	50	63	75311	47
Vestlandet	7	9	40156	25
Mid-Norway	11	14	13660	8
Northern Norway	10	13	17647	11
Sørlandet	2	3	14593	9
Total	80	100	161367	100

By far the greatest number of co-operating partner firms in our survey are located in the counties around Oslo, representing more than 60 percent of the total number of respondents. In comparison, only 47 percent of all Norwegian companies are located in the Østlandet region.

Another striking feature is that few of these respondents are located in the western parts of the country. The overall distribution of firms in Norway show that one out of four companies are located in this region, but in our survey only 9 percent belong there. Respondent companies from the most northern parts of Norway are represented with just about the equal shares as the overall distribution, and the companies from Mid-Norway are a bit over-represented. Sørlandet has a low representation of our respondents, but then again only 9 percent of all Norwegian firms are in fact located there.

3.2.2 Innovation activity

As in the case of contract partner firms, we asked the collaborating partners about their innovation activity. The same conditions and definitions were used in this survey as in the contract partner firm survey (see 3.1.2).

The companies are regarded innovative if they have actually introduced technologically new or improved products, services or processes in the period 1998 to 2000, but also if they have undertaken activities to develop or introduce technologically new or improved products, services or processes which have failed or are yet to come.

Using this definition, which enables a comparison with the Community Innovation Survey (CIS, Norway, 1997), above 80 percent of total co-operating partner firms of this particular survey are innovative. The co-operating partner firms are fare more innovative than the average Norwegian firms, where only 31 percent of the companies report to be engaged in innovation activities.

As the table below shows, there are some differences in innovation activity related to the size of the co-operating firms. The least innovative size group is that of the smallest firms (less than 20 employees), but still they are far more innovative than the CIS average of that group. Three out of four of the smallest firms have innovation activity, compared to one fourth of the CIS firms.

The most innovative size groups are the medium sized firms (20 to 100 employees), with a 90 percent share of innovative firms. The shares of the CIS are between 30 and 40 percent. The table shows that the co-operating firms of the survey generally are very innovative, but compared to the equivalent shares of the contract partner firms (see 4.1.2) the shares of the co-operating partners are a bit lower. Distributing the innovative co-operating partners into sectors, the industry sector has the highest share of innovative firms (87,1 percent) followed by services with share of 78,6.

Table 3.2.4: Share of innovative firms/enterprises by size. (N=60, N=3203).

Size distribution	Number of firms with innovation activity	Share of firms with innovation activity (%)	Share of firms with innovation activity (%) CIS Norway
0-19	23	74.2	24
20-49	9	90.0	30
50-99	10	90.9	37
100-249	6	85.7	52
250+	12	80.0	63
Total	60	81.1	31

Innovation performance

To get a picture of the actual results of the high level of innovation activities of the co-operating firms of the survey, we will first try to measure the results in terms of new or improved products/services of the firms developed in the period from 1998 to 2000 as a proportion of their sales in 2000. Secondly, we will present the share of co-operating partner firms that have introduced products/services not only new to the firms, but also totally new to the market, believing that this more radical type of

innovation will be of a particular importance to further development of the companies.

Table 3.2.5: Share of firms with new or improved products/services of sales in 2000, by size (N=28, N=1176).

Size of firms	Number of firms	Average shares of sales	CIS Norway
0-19	13	87	24
20-49	6	100	24
50-99	3	60	22
100-249	2	67	23
250 +	4	100	25
Total	28	85	25

As the table above shows, 85 percent of the sales of the collaborating partner firms' total is due to income from new or improved products/services in 2000. It should, however, be noted that the number of respondents to this question is very low. Of 60 innovating firms, only a little less than half responded that they were able to distribute their sales on some given product groups (products/services new to the company, improved products/services or unaltered products/services).

The explanation for the low response rate to this particular question is not clear. One possibility might be that the firms find it hard or unfamiliar to distribute their sales figures on the given product groups, and therefore skip the question. Since the respondents that have answered this question show such high levels of new or improved products/services it is possible that this is a group of particularly innovative firms, very conscious of the results of their innovation activity. Being such conscious innovators, the firms have no problem distributing the sales on the given product groups. The companies that do not respond may, on the other hand, be less oriented towards the concept of innovation.

Keeping the low response rate in mind, it is interesting to note that there are differences in the average shares of sales between the various size groups. Almost 90 to 100 percent of sales in small firms of less than 50 employees came from new or improved products/services in 2000. Similarly, the largest firms of more than 250 employees report that all sales in 2000 was made up of new products/services.

Of the innovative co-operating firms close to 60 percent report that they have introduced products or services not only new to the company but also new to the market. Overall the shares of the innovating co-operating partner firms are a great deal higher than the CIS average.

Among the smaller firms (0-19 employees) about half of the firms report to have introduced products or services new to the market. The group of firms with 20-49 employees has the highest share of such totally new innovations, in sharp contrast to the CIS average. It should, however, be noticed that the sample is quite small, with a small amount of firms in each size group, which makes it difficult to say anything definite about the size differences related to this particular point.

Distributing the co-operating firms by sectors, close to 70 percent of the service sector firms report having introduced products and services new to the market. The figure for the industry sector is about 55 percent. Compared to the contract partner firms, the shares of the co-operating partners are generally lower.

Table 3.2.6: Share of firms with innovation activity that have introduced products or services 'new to the market', by size (N=43, N=1351).

Size of firms	Number of firms	Share that answered 'yes'	CIS Norway
0-19	7	50	31
20-49	5	71	27
50-99	5	46	34
100-249	6	60	34
250+	20	65	48
Total	43	59	32

As with the contract partner firms we not only wanted to find out whether the co-operating firms innovate, but also *how* they innovate and how important the various forms of innovation are.

As the table below indicates, *all* the innovating survey respondents report internal R&D, compared to a mere 44 percent in the CIS 'control' group. About two thirds of the firms report training linked directly to technological innovations. It is also striking that the co-operating partner firms' innovation activity has a higher share of external R&D compared to the CIS average. Of all the different innovation activities below industrial design and other production preparations for technologically new or improved products has the lowest share.

Table 3.2.7: Share of firms that take part in different innovation activities in 2000. (N=46, N=1351).

Types of innovation activity	Number of firms	Share of firms that have answered 'yes' (%)	Share of firms that have answered 'yes' (%) CIS Norway
Internal research and development	46	100	44
External research and development	32	70	28
Training directly linked to technological innovations	35	76	57
Market introduction of technological innovations	24	52	33
Acquisition of machinery and equipment	23	50	26
Industrial design, other production preparations for technologically new or improved products	17	37	44
Acquisition of software and other external technology	21	46	22

Distributing the innovative co-operating firms by size shows that particularly the group of small firms (0-19) report low involvement as regards the various kinds of innovation activity. This is especially the case as regards external R&D, but training directly linked to technological innovations and market introduction of technological innovations also show low shares.

This suggests that in spite of an unusually high level of internal R&D, the small co-operating partners firms struggle with resource constraints, just like most small firms.

Above 60 percent of the firms belonging to the industry sector report to be actively involved in market introduction of technological innovations. The service sector and the 'other' sector figure with respectively 47 and 33 percent. The service sector firms on the other hand are the most active as regards acquisition of software and other external technology, industrial design, and training linked directly to technological innovations.

Table 3.2.8: Share of firms that take part in different innovation activities, by size. (N=46).

Innovation activities/Size of firms	0-19	20-49	50-99	100-249	250 +	Total
Internal research and development	100.0	100.0	100.0	100.0	100.0	100.0
External research and development	42.9	71.4	85.7	50.0	100.0	69.8
Acquisition of machinery and equipment	42.9	28.6	57.1	66.7	50.0	48.8
Acquisition of software and other external technology	35.7	42.9	71.4	50.0	30.0	44.2
Industrial design, other production preparations for technologically new or improved products	35.7	28.6	28.6	50.0	30.0	34.9
Training directly linked to technological innovations	64.3	71.4	100.0	66.7	70.0	74.4
Market introduction of technological innovations	35.7	71.4	42.9	66.7	50.0	51.2

Innovation costs

In order to determine what innovation activities are the most important for the co-operating firms we have calculated the shares of innovation costs used on different innovation activities. The table below shows the distribution of average shares of innovation costs.

Almost half the costs of the co-operating partner firms are spent on internal R&D, which is about twice as much as the CIS average. Following internal R&D, at about 15 percent each, external R&D and acquisition of machinery and equipment make up the second most important innovation activities in terms of innovation costs.

However, even though the cost of acquisition of machinery and equipment has a high average share among the collaborating firms in the survey, the CIS average is twice as high. Compared to the contract partner firms the co-operating partners on average spend more money on acquisition of machinery and equipment (10 percent vs. 15,9 percent).

Table 3.2.9: Distribution of average shares of innovation costs used on different innovation activities in 2000 compared with CIS. (N=44, N=104).

	Internal research and development	External research and development	Acquisition of machinery and equipment	Acquisition of software and other external technology	Industrial design, other production preparations for technologically new or improved products	Training directly linked to technological innovations	Market introduction of technological innovations
Survey	48.2	15.4	15.9	3.2	3.8	6.8	6.5
CIS	26	7	36	10	7	9	4

Distributing the co-operating firms by size, the table below shows that the firms of more than 250 employees have the highest share (almost 70 percent) of innovation costs used for internal R&D. Together with external R&D and acquisition of machinery and equipment the internal R&D activities make up more than 90 percent of the costs spent on different kinds of innovation activities in the largest companies.

Compared with the contract partner survey, the large co-operating firms of the User oriented projects show a marked higher average share of innovation costs spent on internal R&D. The group of large contract partner firms reports a share of around 15 percent less than the equivalent size group of collaborating partner firms.

Of the collaborating firms, the companies of 50-99 employees have the lowest share of innovation cost spent on internal R&D. The firms with 20-49 employees of the co-operating firms spend almost twice as much on external R&D as all the other size groups, and almost nothing on acquisition of machinery and equipment.

Table 3.2.10: Distribution of average shares of innovation costs used on different innovation activities in 2000, by size of firms. (N=44, N=104).

	Internal research and development	External research and development	Acquisition of machinery and equipment	Acquisition of software and other external technology	Industrial design, other production preparations for techno-logically new or improved products	Training directly linked to technological innovations	Market introduction of technological innovations
0-19	49,9	10,8	14,9	2,3	8,6	7,2	6,2
20-49	50,8	27,6	0,2	3,3	0,0	5,3	12,8
50-99	34,1	15,2	25,0	7,4	0,1	12,4	5,7
100-249	46,0	11,9	27,1	2,1	1,7	6,6	4,6
250+	68,5	10,5	11,6	2,2	0,3	0,6	6,3
Survey total	48,2	15,4	15,9	3,2	3,8	6,8	6,5

Although at a low level the companies belonging to the service sector have a marked higher share of innovation costs directed towards industrial design and other production preparations for technologically new or improved products than both the industrial sector and the residual category sector (8,5 percent in the service sector and close to zero in the other two sectors). This is also true for financial resources used on training linked directly to technological innovations, where the service sector

spends almost 11 percent of total innovation costs, the industry sector only half as much and the 'other' sector use almost nothing at all.

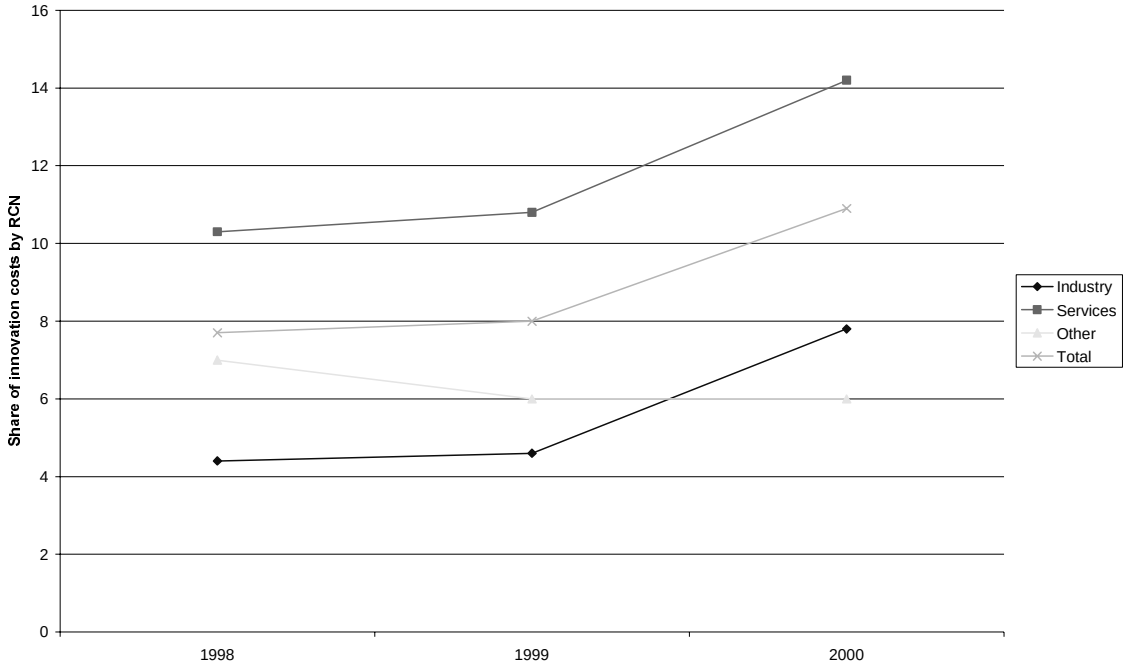


Figure 3.2.1: Share of total innovation costs financed by RCN in the years 1998, 1999 and 2000, by sector (N=52, N=53, N=59)

The figure above shows the average contribution of RCN funding to the total innovation costs of the co-operating partner firms of the survey. The collaborating firms were asked to give the RCN share of total innovation costs for the period 1998 to 2000. The overall development pattern of the co-operating partners distributed by sector corresponds well with the contract partner development pattern (see figure 4.2.1).

In the chosen period there has been a general rise in the proportion of innovation costs financed by RCN to co-operating firms participating in User oriented projects, although the 'other' category has experienced a minor fall. The industry sector has risen from about 10 percent to above 14 percent RCN share of total innovation costs, the service sector from a little less than 8 percent to 11 percent. Unlike the contract partner pattern development, the RCN proportion of the service sector innovation costs is below the industry sector's share.

The table below distributes the RCN share of total innovation costs by size of firms. The most striking result of this distribution is the marked growth of RCN funding to the firms with less than 50 employees, the larger firm size groups remaining relatively stable at a low level. Both the group of 0-19 employees and the group of 20-49 employees rise by 6 percent in the 1998-2000 period.

The fact that the RCN funding as a share of total innovation costs of the larger firms is low suggests that the larger firms have alternative sources of funding, and also that the RCN projects only make up a minor part of a large portfolio of company

innovation activities and research projects. The RCN User oriented projects are in all likelihood of greater importance to the smaller companies with limited resources to spend on innovation activity.

Table3.2.11: Share of total innovation costs financed by RCN in the years 1998, 1999 and 2000, by size of firms (N=51, N=52, N=58)

	1998	1999	2000
0-19	11	12	17
20-49	7	9	12
50-99	4	4	4
100-249	5	0	2
250+	3	3	5
Grand Total	8	8	11

Innovation collaboration

As with the contract partner firms, we want to find whether the co-operating firms of the user driven projects in general participate in innovation collaboration, and with what kinds of partners. Then, using international collaborating partners of the firms as an indicator, we want to investigate whether the firms are oriented towards international markets (cp. p 36).

As the table below shows the co-operating partners of the RCN funded projects collaborate more often with companies and other institutions compared to the average Norwegian firms. The co-operating firms report high shares of co-operation with customers, but also with suppliers of equipment, although the service sector firms are a little less active in co-operating with their equipment suppliers than the other two sectors.

Over all the service sector firms display lower shares of co-operation than both the industry sector and the 'other' sector. What is particularly evident is that the co-operating firms of the survey report very high levels of collaboration with universities, colleges and public or private research institutes compared to the CIS average.

Table 3.2.12: Share of firms reporting innovation collaboration with different partners in the period 1998-2000, by sector. (N=70).

	Survey			CIS		
	Industry	Services	Other	Industry	Services	Other
Other companies within the same enterprise	65	59	40	35	44	39
Competitors	29	36	40	8	10	24
Customers	85	76	80	25	25	29
Consultancies	67	58	60	14	20	31
Suppliers of equipment	96	63	100	26	39	46
Universities and colleges	76	71	100	15	11	32
Public or private (non-profit) research institutes	71	61	60	18	13	33
Share of firms with innovation collaboration, total	100	100	100	47	58	65

Distributing the co-operating partner firms of the survey by the location of their collaborating partners in general the table below shows that close to all the companies co-operate with partners in Norway. The industry sector shows a higher

propensity to co-operate with partners in the EU than the service sector firms and the firms belonging to the 'other' sector.

The fact that more than two thirds of the industry sector firms co-operate with partners in the EU indicate that they are oriented towards this market, and that the companies seek opportunities there, either in order to conquer a new market or in order to increase existing sales.

Considering the co-operation with partners in the EU and partners outside EU and Norway the service sector firms report low shares. This is particularly the case with partners outside EU and Norway, as only 22 percent of the service sector firms collaborate with such partners. Possible explanations might be that the most foreign markets of service firms are either difficult to enter because of certain aspects of service products delivery or perhaps because of cultural differences.

Table 3.2.13: Share of innovative firms collaborating with partners located within and outside Norway in the period 1998-2000, by sector. (N=70).

	Survey			CIS		
	Industry	Services	Other	Industry	Services	Other
Partners in Norway	96	100	100	43	53	64
Partners in EU	68	47	50	21	20	27
Partners outside EU and Norway	36	22	50	9	10	15
Share of firms with innovation collaboration, total	100	100	100	47	58	65

3.2.3 Questions related to the specific RCN funded project

One of the main purposes of the survey is to investigate the results and effects of the User oriented projects funded by RCN, and also to depict the role of RCN in relation to its customer firms and its possible contribution to the effects achieved. To be able to distinguish between different kinds of effects it is important to figure out how many project are actually finished or still running.

The table below shows that just above 45 percent of the projects in which the co-operating partners participate are already finished, i.e. exactly the same level as for the contract partner firms. As in the contract partner survey it is the size groups of firms with 50-99 and 100-249 employees that show the lowest shares of projects concluded, and this must be kept in mind when analysing the effects of the survey.

Table3.2.14: Share of firms that reported the projects were already finished, by size. (N=74).

	0-19	20-49	50-99	100-249	250+	Total
Share of projects that were not finished (%)	48	50	64	71	53	54
Share of firms finished (%)	52	50	36	29	47	46

Industrial and scientific results

The collaborating partners of the User oriented projects were asked to state what industrial and scientific results they have achieved from the project. It was specified that the results were to be for the firm itself, *not* for the project as a whole. The table below shows the number of various industrial results the co-operating partners reported, and an average per type of industrial result has been calculated.

Table 3.2.15: Number of industrial results by type for the co-operating partner firms, absolute number and average result per project. (N=51)

Industrial results	Number	Average number of results per project
New patent applications	8	0,25
Licensing contracts	4	0,14
New prototypes	29	0,78
New products/services	136	2,83
New processes, methods, models	45	0,88
Enterprise utilizing new technology	14	0,41
Company start ups	7	0,23
Total	243	5,52

All in all the co-operating firms report 243 industrial results. On average the co-operating partner firms therefore report a remarkably high number of industrial results (5.5).

The most important type of industrial results seems to be the development of new products or services, which show an average number of 2.8 new products/services per project. The reason for this is that one respondent firm reports 100 new products or services as a result of the project, and this influence both the average number of new products/services and the industrial results total. Apart from a high actual number of new products/services due to the 'outlier' firm mentioned, new processes, methods and models as well as new prototypes are important industrial results from the co-operating partner firms of this survey.

Of course the 'outlier' also has an influence on the sector distribution of industrial results. The firm that reports 100 new products/services belongs to the industry sector, and this explains why the industry sector firms of the collaborating firms show very high average numbers of new products and services per project (7.2) as opposed to the service sector of a mere 0.9 and the 'other' sector of 0.8. However, the industry sector also has the highest average number of both new processes, methods and models per project (1.4) and of new prototypes (1.4), but the actual numbers of results reported are lower on these latter variables.

Considering the size of the collaborating firms contributing to the number of different industrial results the group of firms with 100-249 employees on average report most industrial results. Again the one firm can explain the very high levels of this group, because the extreme values are especially found in the new products or services category. However, this size group shows a high average number of all the various industrial results except from licensing contracts (0) and company start-ups (0.5). Also the smallest companies (0-19 employees) show high average numbers of new products or services. The largest firms of 250 or more employees contribute the most to the high average numbers of new processes, methods and models.

In addition to industrial results we asked the co-operating partner firms to report on scientific results of the project for the individual firm.

Table 3.2.16: Number of scientific results by type for the co-operating partner firms, absolute number and average result per project (N=73).

Scientific results	Number	Average number of results per project
Completed doctorates	3	0.04
Articles in refereed scientific journals	5	0.26
Reports or articles in the professional/trade press	18	0.86
Books etc	1	0.01
International conferences	12	0.27
Total	39	1.44

The total numbers of scientific results of the co-operating companies are 39 and the average number of results that come from each project is 1.4. The most important form of scientific results among the collaborating firms are reports or articles in the professional/trade press.

All the sectors contribute with high levels as regards this variable. Compared to the reports from the project leaders for the projects as a whole, the collaborating partner firms do not contribute much to the scientific results of the project as a whole. This suggests that the contract partner firms in a better way than the co-operating firms are able to utilize and exploit the scientific effects and results of the User oriented projects.

The relatively high number of respondents reporting that international conferences were important scientific results is equally divided between the service sector and the 'other' sector. It is, however, not quite clear what this variable means. Unfortunately, the questionnaire contained a error; the variable should have been 'international conference papers'. There is therefore some uncertainty regarding the interpretation of the answers under the category 'international conferences'.

Effects already achieved

In the contract partner survey we asked the project leaders to evaluate the effects of the *projects as a whole*. In this way we got an overall assessment from the person responsible for the project. However, the effects may be perceived differently from the co-operating firms' point of view, and we therefore asked them to evaluate the effects *for their company*. The same measures were used as for the contract partner companies and the project as a whole.

As the figure below shows the achieved effect considered most important by the collaborating firms was the strengthening of the existing knowledge base. This is in accordance with the answers given by project leader for the project as a whole and for the contract partner firms specifically. 58 percent of the collaborating firms report to have achieved this effect. Thee project leaders reported just over 50 percent for the projects as a whole and the contract partners almost 60 percent.

Secondly, almost 40 percent of the co-operating firms report to have achieved an increased practical problem-solving ability. This is also in line with the effects reported for the projects as a whole and for the contract partners. The co-operating

firms report that the least important of the already achieved effects was moving their R&D efforts from short-term to longer-term activities.

All in all the firms of both the co-operating partner survey and the survey of contract partner firms show that the first *achieved* effects of the User oriented projects – in other words the *first* effects to appear from the projects – are normally knowledge building and competence upgrading. 'Economical effects' such as increased shares in existing markets, access to new markets and increased productivity and turnover are rated important only by 20 percent or less of the firms of both surveys.

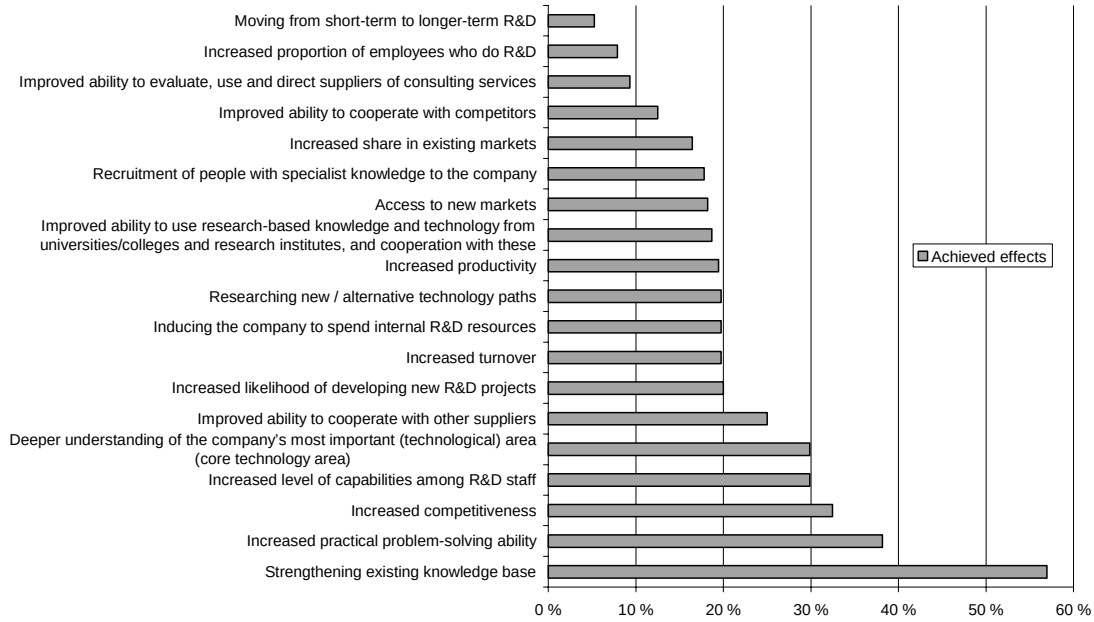


Figure 3.2.2: Share of co-operating partners that have achieved effects as a result of the project (N=45

Future effects

When turning to the effects to be achieved within two to three years the picture is turned the other way around. The co-operating partners now believe that economical effects will be more important. The table below shows that between 45 and 50 percent of the collaborating firms expect economical effects such as increased turnover and competitiveness and access to new and increased share of existing markets to be very important. This picture coincide with both the contract partner firms and the project leaders' evaluation of the effects of the projects as a whole. However, the rates of the expected economical effects of the contract partner firms and the project as a whole are much higher, close to 70 percent.

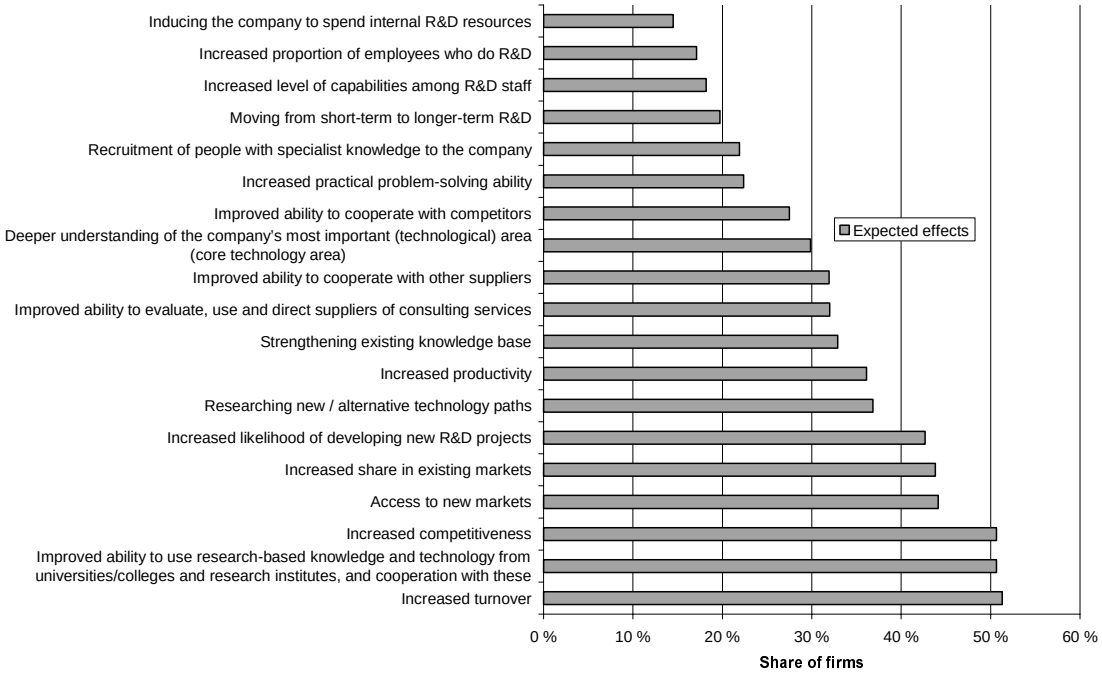


Figure 3.2.3: Share of co-operating partners that expect different effects to be achieved within 2-3 years as a result of the project (N=45)

In addition to the economical effects expected to become important for the collaborating partner firms is an improved ability to use research-based knowledge and technology from universities/colleges and research institutes, and co-operation with these. Over half of the collaborating firms *expect to achieve* this effect within two to three years. Looking at the contract partner firms this particular effect is rated on second place (47 percent) of very important effects *already achieved.*

This suggests that one of the gains of being a contract partner is the development of a fairly direct improved ability to understand and take use of research-based knowledge, while it takes a longer time period for co-operating partners to develop the same ability. Since many User oriented projects of RCN are joint company and university/research institute projects it seems as though the contract partner firms get the most immediate benefits from the collaboration with the research institutions. Given that many of the co-operating firms may be loosely connected to the project, for instance as suppliers, this should come as no surprise.

One way for the co-operating partners to achieve improved ability to use research-based knowledge and technology from universities/colleges and research institutes may be either through direct interaction with the research institutions or through amore indirect interchange through the contract partner firms.

Table 3.2.17: Share of firms reporting that different forms of knowledge transfer was 'very important' in collaboration with partners in the project. (N=103).

	Number of firms responding	Share of firms that answered 'very important'
Meetings/presentations	58	29,3
Written documentation such as reports, specification, technical drawings etc.	56	39,3
Practical work	47	40,4
Delivery of prototypes or finished product components	30	46,7
Exchange of personnel	27	7,4
Training schemes or courses	38	15,8

The co-operating partner firms were asked to report on various kinds of knowledge transfer *between the partners of the user oriented projects.* The most important form of knowledge transfer is delivery of prototypes or finished product components. Almost half of the firms that responded report that this is a very important form of knowledge transfer. Next, with shares of around 40 percent each, come practical work and written documentation such as reports, specifications, technical drawings etc.

The collaborating firms of the User oriented projects seems to be more focused on practical solutions as a mode of knowledge transfer, while *the collaborating firms* seem to contribute most through their specialist knowledge in developing prototypes or finished product components. The partners in the User oriented projects can therefore be characterised as complementary in the way that contract partner firms rate written documentation and meetings/presentations high, while the collaborating firms seems to be more oriented towards developmental work.

Both the contract partner firms and the co-operating firms, however, rate practical work as a very important form of knowledge transfer, and this is probably the most important arena for knowledge transfer between the partners in the User oriented research project.

3.2.4 The role of RCN

Advice and guidance

With a particular focus on the collaborating firms, what then is the role of RCN in the User oriented projects during the application process and during the course of the projects? Do the co-operating firms feel they get the proper advice or guidance to the projects?

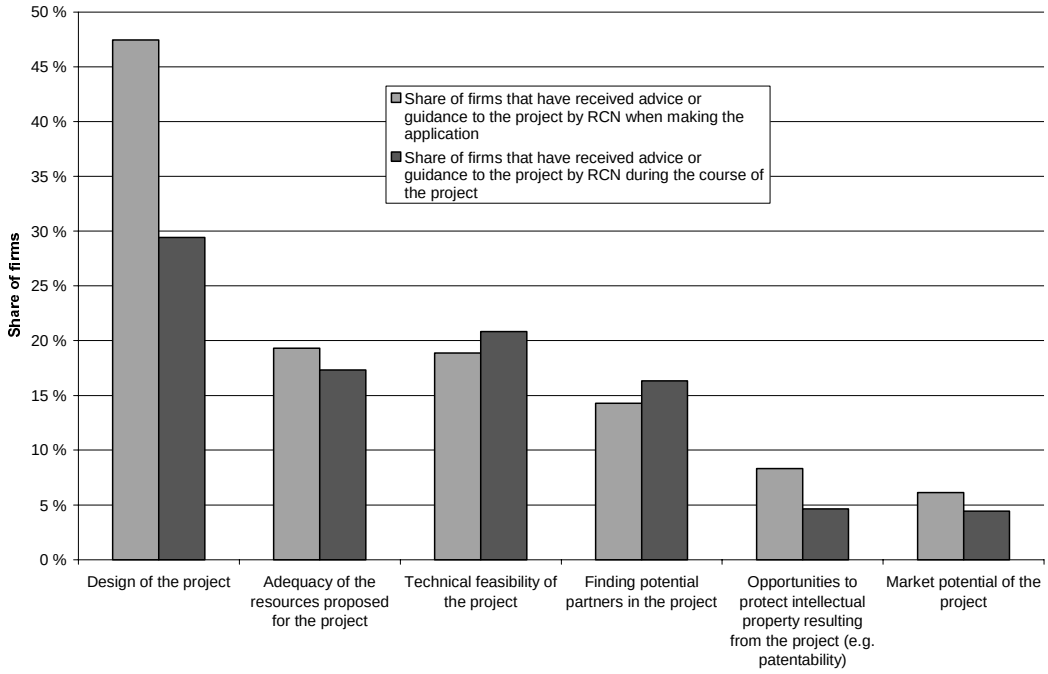


Figure 3.2.4: Share of firms that have received advice or guidance to the project by RCN when making the application (N=59), and during the course of the project (N=52).

The figure above shows the shares of firms that have received advice or guidance by the RCN. The columns to the left show the share of firms given help when preparing the application and the columns to the right show the assistance given during the course of the project. Clearly, the RCN is most active in assisting the firms in designing the project.

Close to half of the co-operating firms state that the RCN has been of help in the early period of the project, and almost 30 percent feel that the RCN follow up later on in the process. Only about 5 in a hundred co-operating firms feel that RCN have contributed with advice or guidance concerning the market potential of the project.

The patterns of the co-operating partner firms are very much in line with the contract partner firms, except that the co-operating firms overall report receiving less advice and guidance from the RCN. It seems that the contract partners relate most to the RCN, probably because they are closer to the Council. After all, they are most likely to use the RCN as a discussion and sparring partner on behalf of the project as a whole.

One dimension of User oriented projects is the co-operation with other external actors, and we wanted to find out whether the RCN was assisting the firms in establishing contact and dialog with external actors such as research institutes, universities and colleges, other companies, public sector and consultants.

Surprisingly high shares of the co-operating firms deem this *not* relevant. This could mean that the co-operating firms do not look for this kind of assistance from the RCN, believing that they can manage without the RCN. However, it can also be that they do not *expect* assistance from the RCN in this area.

The co-operating partner firms are most satisfied with RCN's help to establish dialog and networks with the public sector (9,1 percent). Here the collaborating firms differ from the project leaders. On behalf of the projects as a whole the project leaders are most satisfied with RCN's help to establish dialog and networks to research institutes (11,8 percent) and universities and colleges (7,5 percent).

Table 3.2.18: Share of co-operating partner firms evaluating RCN's help with establishing dialogue and networks with external actors in connection to the project. (N=77).

	Very dissatisfied	Neutral	Very satisfied	Not relevant	Total
Research institutes	14,3	19,5	3,9	62,3	100,0
Universities and colleges	15,6	10,4	1,3	72,7	100,0
Other companies	13,0	11,7	0,0	75,3	100,0
Public sector	15,6	20,8	9,1	54,5	100,0
Consultants	18,2	18,2	3,9	59,7	100,0

We asked the co-operating companies what the RCN has done to help *after* the project had come to an end. Of the firms reporting that the projects were finished, the table below shows that most of the firms either respond that the RCN had not been of any help after the end of the project or that the firms are not aware of such help. RCN has given most help by creating contact with other partners (23,5 percent) and in assisting in the marketing results from the project (20,6 percent).

Table 3.2.19: Share of firms that after the end of the project report RCN's help. (N=44).

	Yes	No	Do not know	Total
... to market the results from the project?	20,6	47,1	32,4	100,0
...to create contact with other partners?	23,5	44,1	32,4	100,0
...to develop the project further?	11,8	47,1	41,2	100,0
...to exploit opportunities available from other business and technology support agencies(e.g. SND, Export Council)?	5,9	50,0	44,1	100,0

Additionality

It is important to investigate what would have happened to the User oriented research projects if the RCN had not funded the projects – the additionality of the RCN funding. The figure below shows that on average, as many as 35 percent of the co-operating firms believe that the projects would have been carried out without changes, altered scale or another timetable. This finding suggests that these projects are actually not at all dependent of the funding of the RCN, and a fairly high percentage of the RCN funding seem to engender a relatively low additionality.

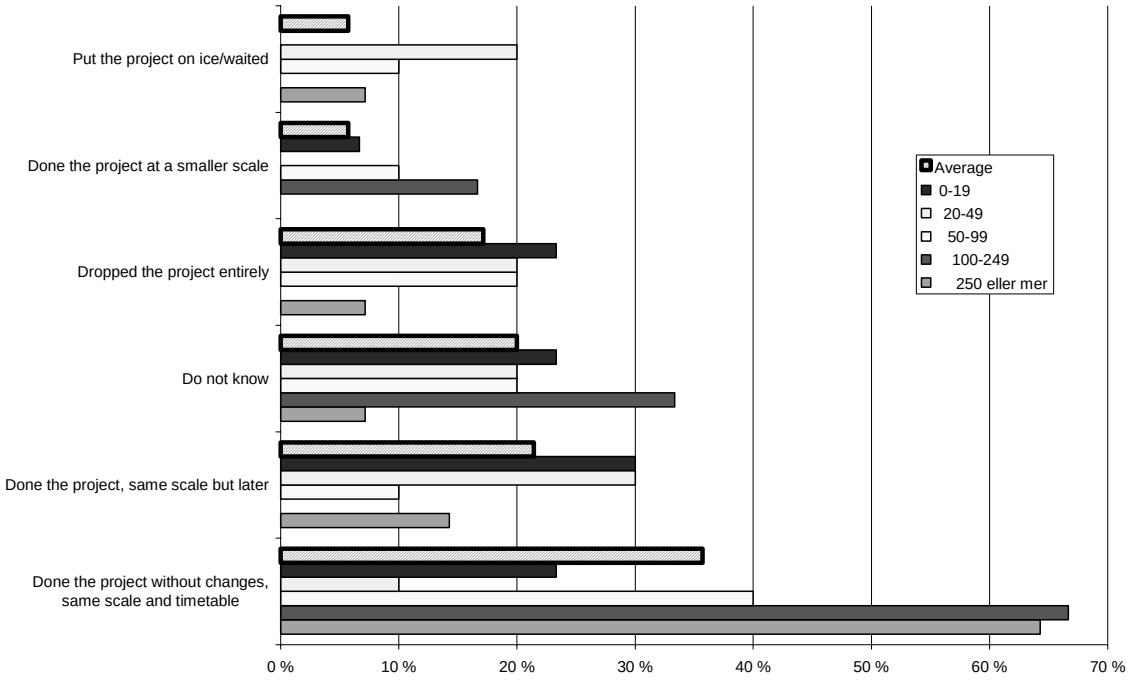


Figure 4.3.5: Share of firms that report on 'what would have happened to the research project if RCN had not funded it, by size. (N=70).

In the groups of firms with between 100 and 250 employees and the firms with more than 250 employees around 65 percent of the projects would have been carried out at the same scale and timetable even without the RCN funding.

The large co-operating partners seem to be the least dependable on the RCN funding. This is in line with the previous finding that large firms seem to have sufficient resources to carry out research and development and general innovation activity on their own.

When considering the smaller co-operating firms, almost one out of four of the companies with 0-19 employees report that the projects would have been carried out without changes. This could indicate that the additionality for the funding even for these firms is fairly low, and that many of the small co-operating firms that participate in User oriented projects funded by the RCN is capable of research projects without RCN support. It should be noted, however, that the co-operating firms often face another situation than the contract partner firms. The co-operating partners may take part in but a small part of the project, and it could indeed be that they could perform these R&D services for another customer.

However, this should be seen in connection with the fact that almost one out of four of the smallest firms also report that the project would have been dropped entirely if the RCN funding was removed. On average 17 percent of all the co-operating firms report that the projects would have been dropped entirely without RCN support. The service sector firms are the ones most like to drop projects if the RCN funding is removed.

The firms' view of RCN

Finally the collaborating firms were asked to judge a range of statements regarding the RCN. The figure below shows the shares of firms that totally agree to the statements made.

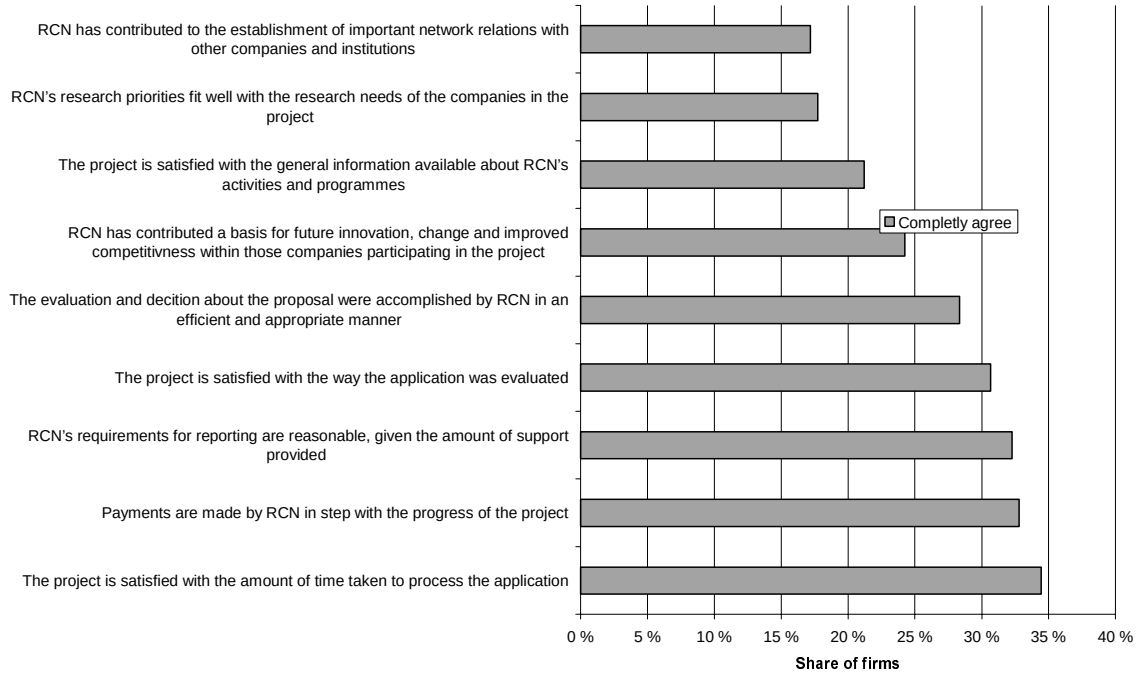


Figure 4.3.6: Share of firms that 'completely agree' to the relevant statements.

More than one third of the co-operating firms of the survey report that they are satisfied with the amount of time taken to process the application, that the payments are made in step with the progress of the project, and that RCN's requirements for reporting are reasonable, given the amount of support provided. However, the proportion of co-operating firms giving these statements are relatively low (30-35 percent) compared to the contract partner firms (45 and 50 percent).

The firms are less likely to completely agree with the statement that the RCN contribute to the establishment of important network relations with other companies and institutions, and that RCN's research priorities fit well with the research needs of the companies in the project. In fact more than half disagree with the statement that RCN contributes to the establishment of important network relations with other companies and institutions, and above 40 percent do not agree the research priorities fit well with the research needs of the companies involved in the projects.

3.2.5 Summary of the co-operating partner firm survey

The companies of the survey to co-operating partners of user oriented research projects are in general very innovative firms. The most innovative firms are the medium sized firms and the least innovative the smallest firms with less than 20 employees. However, even though the small firms of the survey show a lower involvement in innovation activities than the rest of the companies, they are fare more innovative than the average Norwegian firms in general. Distributed by sector, industry is the most innovative sector (87 percent) followed by the service sector at 79 percent.

The firms of the survey also show a high propensity to introduce radically new innovations, that is, products/services or processes not only new to the firm, but also new to the market. 60 percent of the co-operating firms have introduced such radical innovations. The medium sized firms are the most innovative of the size groups. By sector, the service firms most often introduce radical innovations, as 70 percent of the companies report to have developed products/services and processes new to the market. The co-operating firms, however, are less likely than the contract partner firms to introduce radically new innovations.

As regards how the co-operating firms innovate, all the firms of the survey conduct internal R&D, and two thirds of the companies spend resources on training linked directly to technological innovations. The collaborating firms also have a high share of external R&D. Overall the small firms of the survey show low shares of involvement in the various kinds of innovation activities.

On average about half of the innovation costs of the co-operating companies are spent on internal R&D, large firms spending near to 70 percent of their innovation costs on internal R&D. Internal R&D, together with external R&D and acquisition of machinery and equipment, on average make up 80 percent of the innovation costs of the co-operating firms of the survey.

In the period 1998 to 2000 the RCN contribution to the firms' innovation budgets has gone up. Industry firms have experienced a rise from 10 to 15 percent and service firms a rise from 8 to 11 percent. Small companies – i.e. with less than 50 employees – have experienced the largest relative growth of RCN contribution to the innovation costs.

The co-operating partner firms in the RCN funded projects are very active collaborators in general, and they particularly co-operate with customers and suppliers of equipment. Not surprisingly the co-operating partner firms show a very high level of co-operation with universities, colleges and research institutes compared to the average Norwegian firms.

The total number of industrial results of the co-operating firms of the survey was very high (243), but this may be explained by very high reported results by one single respondent. Despite of this, the most important industrial results of the collaborating firms are new products/services, new processes, methods and models as well as new prototypes. The industry sector shows the highest average numbers of all of the results. Small firms report high average numbers particularly on new products/services and large firms report high numbers of new processes, methods and models.

In contrast to the industrial results, the numbers of scientific results of the co-operating firms are much lower. The firms only report 39 scientific results, which make up 1,4 results per project. The most important scientific results of the collaborating firms are reports or articles in the professional/trade press, and all sectors alike score high on this variable. The relatively low reported numbers of scientific results indicate that the co-operating partner firms of the user driven projects do not contribute too much to the scientific results of the project as a whole.

The effects of the projects were divided into already achieved and expected effects. The most important effect already achieved by the co-operating firms is a strengthening of the firms' existing knowledge base. The firms also report increased problem-solving ability.

As regards future effect, the companies are more focused on economical effects such as increased turnover and competitiveness as well as access to new and increased share of existing markets. One tentative conclusion is that the first effects to appear from the research projects are knowledge and competence upgrading effects, and that economical effects takes more time.

According to the co-operating firms the most important form of knowledge transfer between the partners of the research projects is delivery of prototypes or finished product components. The firms also report that practical work as well as more codified knowledge in the form of written documents (reports, specifications, technical drawings etc) are important forms of knowledge transfer between the co-operating partners. In general, however, the collaborating firms seem to have a more practical focus than the contract partner firms.

When looking at the non-financial role of the RCN, the advisory role, the co-operating companies hold that the RCN is most active in assisting the companies in designing the project at the time of making the application, but also during the course of the project. According to these firms little guidance is offered concerning the market potential of the project. Help in establish contacts and networks with external actors is also absent. All in all the co-operating partners seem to get less advice than the contract partner firms.

On average 35 percent of the firms believe that the projects would have been carried out without changes (unaltered scale and time table) even without the RCN funding, which indicates a low additionality of the RCN support to user driven projects. In fact the additionality is even lower for larger firms. Of the largest firms (over 100 employees) about 65 percent report that the projects would have been carried out without changes even without the RCN funding. The smaller firms, on the other hand report that one out of four projects would have been dropped entirely if the funding was removed.

Above one third of the co-operating firms report that they are satisfied with the amount of time RCN takes to process the applications. The payments are made in step with the progress of the projects and that RCN's requirements for reporting are reasonable, given the amount of support provided.

However, these firms do not completely agree with the statement that RCN contributes to the establishment of important network relations with other companies and institutions, or that RCN's research priorities fit well with the research needs of the companies in the project.

3.3 Results from the survey to project leaders in institutes

This chapter presents the results of the survey sent out to project leaders of user oriented projects of the RCN working in various kinds of contract partner *institutes*.

The word 'institute' will be used for a variety of institutions: regular research institutes, university and college institutes (units or groups) and competence centres and institutions.

The project leaders were asked questions related to the institute were he or she works. The questionnaire included general questions about how the institutes work, and what kinds of collaborating partners the institutes most often relate to. More specific questions related to the particular RCN funded project were also added in order to map effects of the projects in the institutes and among participating firms. Lastly the project leaders were asked questions on how he or she perceives RCN.[20]

In section 3.4.1 we present the distribution of the respondents, and variables describing the institutes in the sample. Thereafter, in section 3.4.2, we present data on the specific RCN funded project. In section 3.4.3 we present the results of how the project leaders perceive the RCN, and what they think RCN could do to improve their services. 3.4.5 sums up the results.

3.3.1 Characteristics of the respondents

We sent out 172 questionnaires to project leaders in institutes, and received 83 answers of which there were 53 unique observations[21]. We divided the respondents into 3 categories according to institute types: research institutes, university/college institutes and competence centres. The table below shows how the respondents are divided into these different categories of institutes.

Table 3.3.1: Type of institutes. (N=83).

	Number of responses	Number of responses in percent
Research institute	60	72,3
Competence centre	5	6,0
University/college institute	18	21,7
Total	83	100

The largest share of project leaders working in institutes, are found in independent research institutes (72 percent), only 21 percent of the project leaders are working in

[20] Large numbers of respondents have not completed the survey by answering all questions; therefore the N differs in the presentation of the results. The N's given points to the highest number of respondents that have answered the question, however some respondents have only answered some parts of the question. In these cases, the shares reflect the number of respondents that have answered that specific category, not the share of the total N.

[21] This means that we have received answers from different projects leaders in the same institute. E.g. we have 10 answers from Marintek. When in the text it is referred to 83 institutes, this refers to 83 responses.

a university or college institute. 6 percent of our respondents work in a competence centre (i.e. a knowledge based institution or consultancy that does not qualify as a research institute due to relatively low R&D activity).

Secondly we divided the respondents into 7 other categories to reflect the main content or area of research of the projects. This categorisation is based on various types of RCN programs of which the user oriented projects belong to. The main research areas of the institute projects are as follows:

Table 3.3.2: Project leaders in institutes, by type of program. (N=83).

	Number of institutes	Number of institutes in percent
Energy, climate and environment	14	16,9
ICT	16	19,3
Maritime	18	21,7
Services	9	10,8
Oil and gas	10	12,0
Building/construction and goods production	8	9,6
Other[22]	8	9,6
Total	83	100,0

The project leaders that respond to our survey are responsible for research projects linked to several different RCN program areas. The largest share of project leaders lead projects within maritime (22 percent), ICT (19 percent) and energy, climate and environment areas (17 percent). Relatively few projects belong to the other categories, and the shares are quite evenly distributed.

Another way of categorising the respondents is according to type of research (basic research, applied research, technical development work and problem solving and implementation in firms). We asked the project leaders to distribute their income in the year 2000 according to these various, but partly overlapping, types of research. In average 55 percent of the income originated in applied research, 26 percent in technical development work, and 25 percent on problem solving and implementation in firms.

[22] The residual category of 'other' includes program areas related to medicine, material technology and food production.

Table 3.3.3: Number of respondents that in the year 2000 received income from any of the financial sources listed. (N=74).

	Number of respondents	Shares of respondents
Norwegian firms	73	98,7
The institute's (group's/entity's) own financing	57	77,0
RCN	74	100,0
Other public financing (e.g. SND, ministries, municipalities)	55	74,3
Norwegian research institutions	38	51,4
Foreign firms	43	58,1
Foreign public sector (excl. EU)	9	12,2
EU financing	46	62,2
Foreign research institutions	7	9,5
Other	20	27,0

Furthermore we asked the project leader whether he or she on behalf of the institute could give a distribution of the income in the year 2000 on different financial sources. The table shows that the largest group of respondents receive income from the RCN and from Norwegian firms. The institutes (or groups/entities) also fund a large share of the projects with their own capital as well as funds from other public financing sources such as SND, ministries and municipalities.

A large number of the institutes report that they get income from abroad, both from foreign firms (58 percent of the institutes) and from EU (62 percent). Looking at differences between institutes, very few university or college institutes get funding from abroad.

Table 3.3.4: Respondents that in the year 2000 received income from any of the financial source listed. Total income, percent of total income, and average finance from each source. (N=74).

	Total finance in 2000 (1000 NOK)	Shares of total finance in 2000, weighted	Shares of total finance in 2000, unweighted
Norwegian firms	7733849	60,4	42,8
The institute's (group's/entity's) own financing	503415	3,9	14,6
RCN	2560795	20,0	23,0
Other public financing (e.g. SND, ministries, municipalities)	334283	2,6	15,1
Norwegian research institutions	17278	0,1	4,2
Foreign firms	1009258	7,9	14,3
Foreign public sector (excl. EU)	8954	0,1	3,3
EU financing	137332	1,1	3,7
Foreign research institutions	7089	0,1	4,0
Other	336196	2,6	4,4
Total	12803250	100,0	-

By adding up total income for the different respondents in the year 2000, and distributing the income by financial sources (weighted shares[23]), we find that the largest share of funding comes from Norwegian firms (60 percent). The second largest source of income is the RCN, amounting to one fifth of total income. Only small parts of the funding come from other financial sources, the greatest being foreign firms, constituting 8 percent of total income in 2000.

The unweighted share of income from Norwegian firms is 43 percent. This is the most important source of income followed by funding from the RCN. Other public institutions such as SND, ministries, and municipality's fund 15 percent. The institute's own contribution amounts to 15 percent as well.

There are great differences between the various types of institutes regarding the share of income derived from different financial sources. Research institutes in our survey receive the largest shares from Norwegian firms, RCN and foreign firms (66, 15 and 9 percent). University and college institutes get the largest share from the RCN and from internal resources (74 and 25 percent).

Table 3.3.5: Respondents' project financing from companies by company size. (N=48).

	Shares of financing, weighted	Shares of financing, unweighted
Small companies (0-49 employees)	25	33
Medium sized companies (50-249 employees)	49	33
Large companies (250 employees and more)	26	58
Total	100	-

The institute based project leaders were asked to give a distribution of the financial support from Norwegian firms distributed according to firm size. The table above shows that firms with 50-249 employees are the biggest clients, 49 percent of the company project funding comes from this group. The rest of the funding from Norwegian firms is evenly distributed among firms with less than 50 employees, and among firms with 250 and more. Looking at the unweighted shares the picture is different; the largest share of income of our respondents (58 percent) comes from the largest companies.

[23] *Uweighted* means that every respondent counts equally when calculating shares, regardless of size, turnover, number of employees etc. *Weghted* means that the totals are taken before shares are calculated, thus enhancing the weight (or influence on the result) of respondents with higher values. An example: Two firms A and B have answered that their total received income in the year 2000 amounted to 1 000 000 (A) and 200 000 (B). If both firms got 100 000 NOK from the RCN, the shares would be 10% (A) and 50% (B) respectively. The 'typical' firm would receive 30% of its' finance from the RCN, since the unweigthed share of total finance from RCN would be on average 30% ((10+50)/2). If you instead want to know how much of overall activity was financed by the RCN you would look at the weighted share, which equals 16.7% ((100 000+100 000)/(1 000 000 + 200 000)) – the figure is lower since the rather low share of firm A (10%) "counts more" in the total than the high share of the small firm B. In other words, the unweighted figures might say more of the "typical" respondent since the answers of all respondents count equally, while weighted figures might say more of the total situation, since dominating respondents will have a dominating influence on the results.

Table 3.3.6:Respondents' project financing from companies by company size and program type, percentage. Weighted shares. (N=48).

	Building/ construction and goods production	Other	Energy, climate and environment	ICT	Maritime	Oil and gas	Services	Total
Small companies (0-49 employees)	26	45	20	32	30	22	54	25
Medium sized companies (50-249 employees)	30	43	60	49	40	46	33	49
Large companies (+ 250 employees)	44	12	21	19	31	32	13	26
Total	100	100	100	100	100	100	100	100

The table shows the distribution of total financing by Norwegian firms, by size of firms and by different programs areas. The share of finance that derives from small firms (less than 50 employees) differs between the program areas. The program area called 'services' has large shares of finance from small firms. Institutes with research projects in fields like 'energy, climate and environment', and 'oil and gas', have low shares of finance from small firms.

Table 3.3.7: Most important form of hand over of project results to companies by institute, absolute numbers and percentage. (N=72).

Forms of hand over	Number of respondents	Shares of respondents
Reports or equivalent documents	72	100
Problem solving at customer's premises	26	36
Technological development work for customer	42	58
Collaboration with customer	39	54
Consulting/consultation	37	51
Seminars, courses, training	31	43
Delivering of technological product	27	38
Test results	37	51
Other forms of knowledge transfer	22	31

The table above shows the number of respondents that have answered the question of the most important form of hand over of projects to private companies. The most common form of distribution from institutes is through reports or similar documents (72). All institutes report this, suggesting that other forms of diffusion are optional. The second largest group of institutes report technological development work for customers (42) and collaboration with customers (39). These forms of diffusion represent a larger degree of interaction between institutes and firms, increasing the potential of learning and competence transfer in the project.

Table 3.3.8: Most important form of hand over of project results to public sector by absolute number and percentage. (N=65).

Forms of hand over	Number of respondents	Shares of respondents
Reports or equivalent documents	65	100
Problem solving at customer's premises	5	8
Technological development work for customer	16	25
Collaboration with customer	23	35
Consulting/consultation	25	38
Seminars, courses, training	20	31
Delivering of technological product	2	3
Test results	4	6
Other forms of knowledge transfer	29	45

We also asked the institutes what were the main types of distribution of project results to the public sector. Almost all institutes report that 'reports or equivalent documents' where among the most important. More than one third of the institutes report that the most important form of diffusion is consulting (38 percent) and collaboration with customers (35 percent). 29 of the institutes (45 percent) reported that 'other forms of knowledge transfer' were the most important.

3.3.2 Questions to the specific RCN funded project

In this section we present the results of the questions that are related to the specific RCN funded project. The project leaders were asked to evaluate the effects of the project for the institute, as well as for the collaborating partners (the project as a whole). Of the 83 responses received, 31 respondents had not yet finished the project (37 percent), while 52 had finished their projects (63 percent).

Table 3.3.9: How did the respondent finance the project? Number of institutes that use different sources, share of total project finance from different sources weighted and unweighted. (N=72).

Financial sources	Number of institutes used different sources	Share of total finance, weighted	Share of total finance, unweighted
Financing of participating firms	37	6.7	21.9
Other Norwegian firms	9	0.2	2.6
The institutes financing	39	22.4	15.3
Other Norwegian research institutions	6	0.4	3.2
RCN	70	69.4	51.4
Other public financing (e.g. SND, ministries, municipalities)	11	0.5	2.8
Foreign firms	1	0.2	0.9
Foreign research institutions	2	0.1	0.8
Foreign public sector (excl. EU)	0	0.0	0
EU financing	1	0.1	0.6
Other financing	1	0.0	0.0
Total	72	100.0	100.0

The table above shows the various funding sources of the specific RCN supported projects. In the first column we present the institutes' distribution on different funding sources in the projects. Not surprisingly almost all institutes receive funding

from RCN. Besides this, a large number of institutes report that the institutes' own financing and the finance from participating firms were used.

Considering the weighted shares of the three most used funding sources; the funding from the RCN is the most important. On average the RCN finance about half the R&D project, while the participating firms accounted for 22 percent and the institutes own finance contribute to 15 percent of total finance. Other financial sources are only used by small number of institutes. Other forms of public financing is used by 11 institutes, on average contributing to 2.8 percent of total finance in each project.

Different types of institutes rely on different financial sources. Among the university and college institutes small shares of finance comes from collaborating firms, suggesting that few of these institutes have such collaboration. For the university and college institutes, the RCN and the institutes' own finance is the most important source of financing.

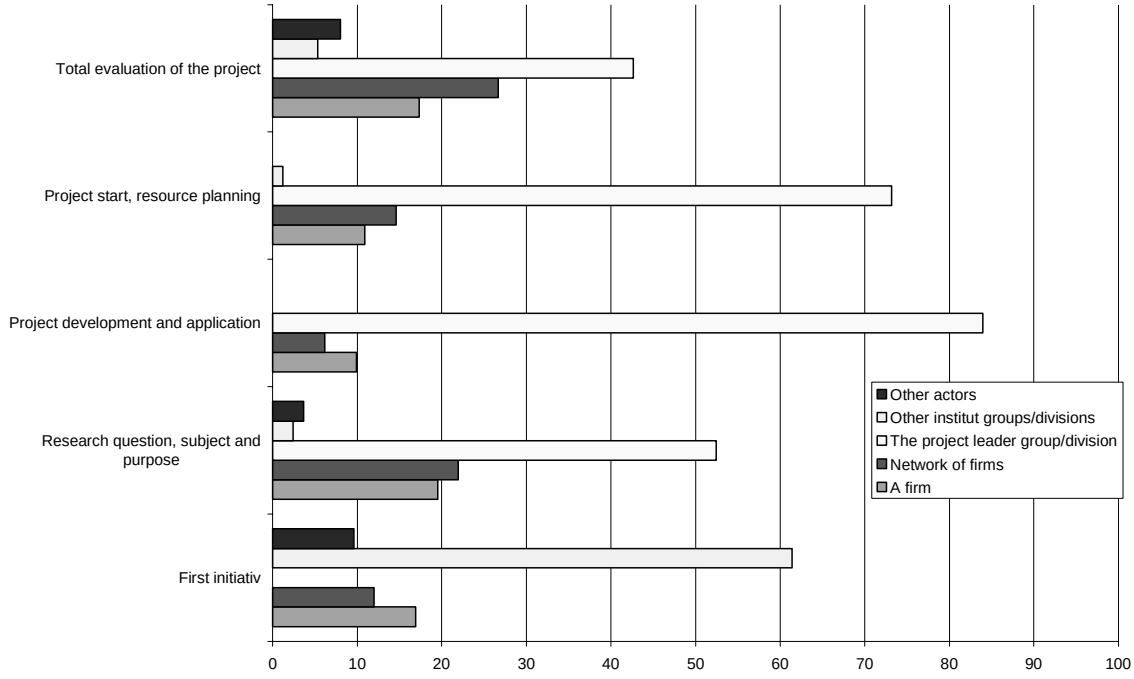


Figure 3.3.1: Actors that had the most important role in different stages of the project. (N=83)

The project leaders were asked to report what actors had played the most important roles during different stages of the project. The figure above gives a distribution of the various actors in the different stages. The figure shows that the institutes (either the group that the project leader work in or other groups within the same institute) have played the most important role in all the stages of the project. The largest share of project leaders say that the institutes have played an important role in the specific project development (84 percent of institutes had the most important role) and in relation to project start-up and resource planning (73 percent).

However, firms also play a role in taking initiatives; as many as 28 percent of first initiatives were taken by firms. Firms (either one single firm or a network of firms) play the most important role in finding important research questions (subject and

purpose) and in the total evaluation of the project, suggesting that collaborating firms take active part in initiation and completion of the research project.

We asked the project leaders to report what kinds of results *the institute* has already achieved from the project, and what kinds of effects that are expected within 2-3 years. The table below shows the share of project leaders in contract partner institutes reporting achieved effects to the institute as a result of the project.

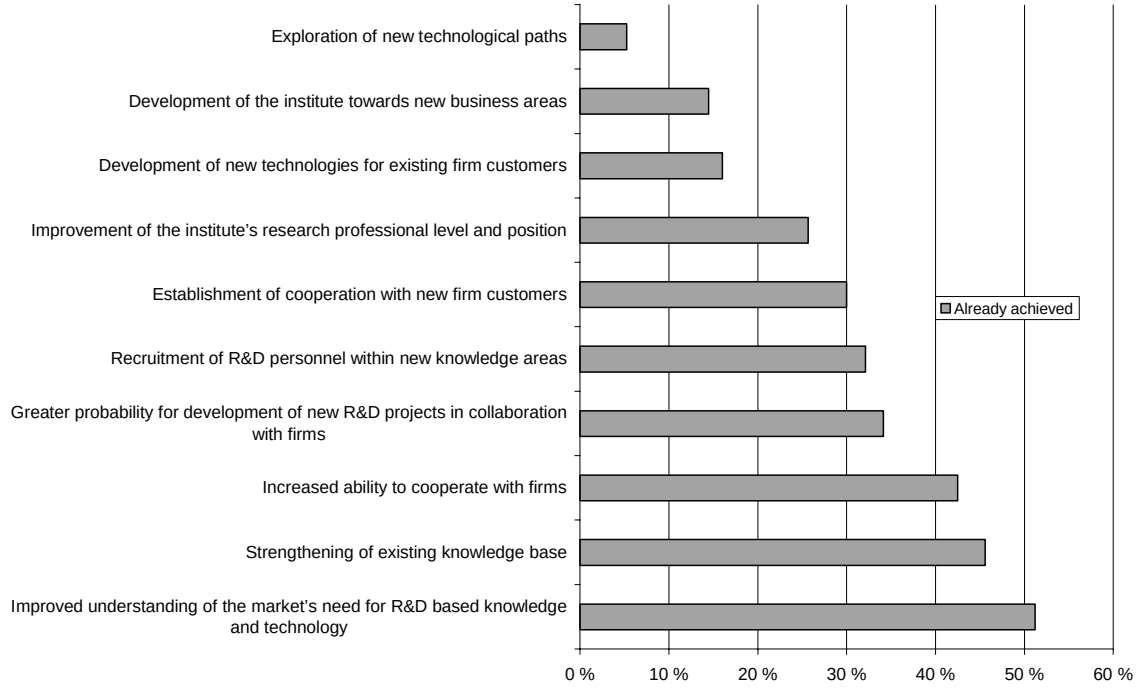


Figure 3.3.2: Share of project leaders in contract partner institutes reporting achieved effects to the institute as a result of the project. (N=75).

All together, the largest share of institutes respond that the different effects from the projects were expected in the future. Looking only at the share of institutes that responded that some effects had already been achieved, the figure above shows that half the institutes, as an effect of the project, have achieved improved understanding of the market's need for R&D based knowledge. Institutes also report that they have strengthened their knowledge base as a result of the project (46 percent), and that they have increased their own ability to collaborate with firms (43 percent). Of the institutes one third report that they, as a result of the project, believe their chances of developing new R&D projects have increased.

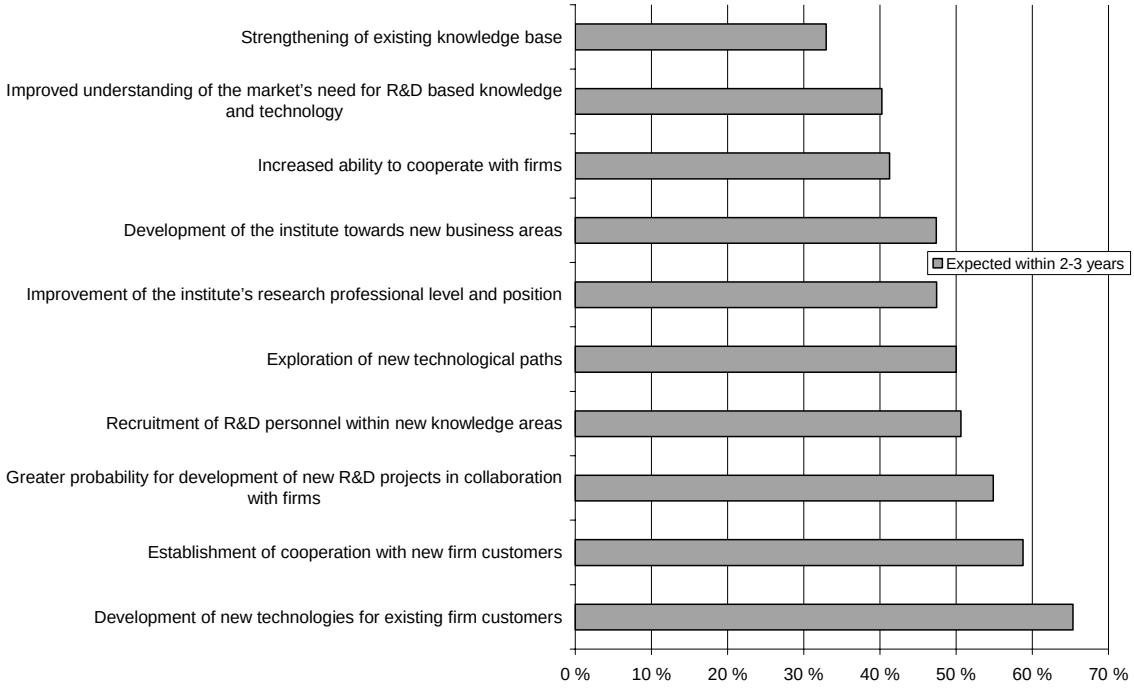


Figure 3.3.3: Share of project leaders that expect different effects to be achieved by the institute within 2-3 years as a result of the project. (N=75).

The figure above presents the shares of project leaders in institutes that expect different effects of the project to come *in the future, 2-3 years from now*. A large number of project leaders expect to develop new technologies for existing firm customers as a result of the project.

The institutes also expect to develop their own competence base, and possibly extend their firm-networks: Many institutes expect to establish collaboration with *new* firms in the future (59 percent), and to face greater probability of developing new R&D projects with firms (55 percent). Half the institutes expect to recruit R&D personnel with new knowledge areas. In general institutes are very positive to future results from the collaboration projects.

We asked the project leaders, on behalf of the project as a whole, to evaluate how he/she perceive the effects the participating firms had had, or expected to have within 2-3 years. Below we present the shares of respondents that report effects 'already achieved' and 'expected within 2-3 years'. We do not the institutes answering 'not

relevant' into consideration.

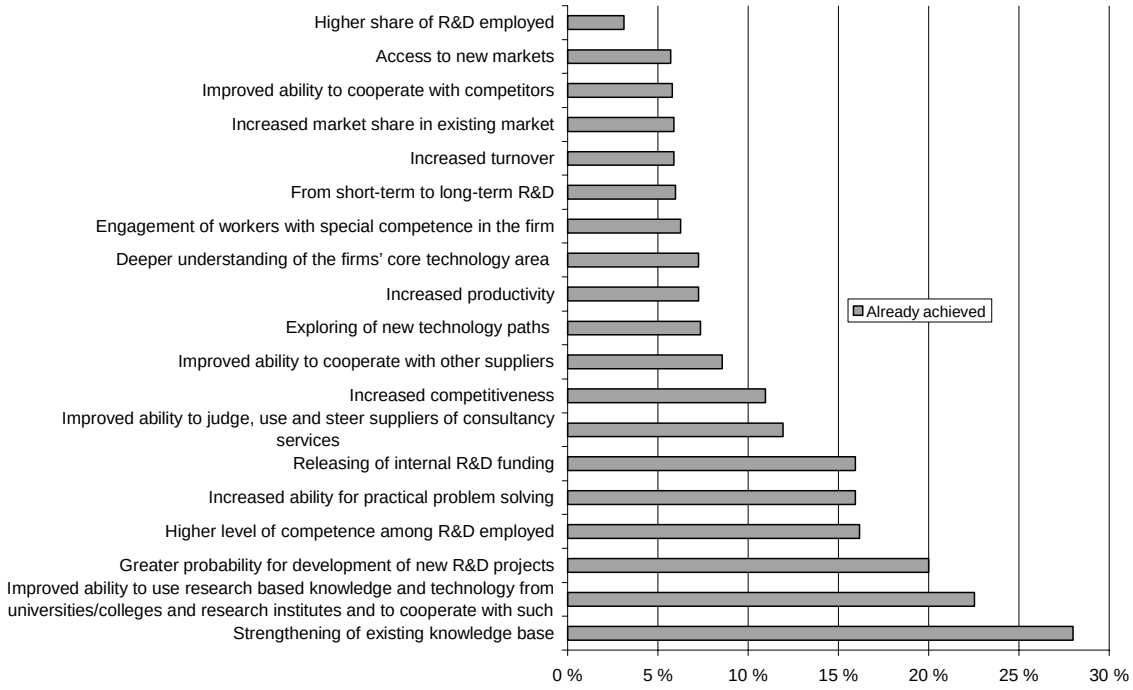


Figure 3.3.4: Share of project leaders in institutes that on behalf of the collaborating firms evaluate which effects have already been achieved as a result of the project. (N=75).

In general, project leaders in institutes do not report high levels of already achieved effects as results of the projects. But, when considering the shares of achieved effects in the collaborating project as a whole, the largest share of project leaders hold that the firms have strengthened their existing knowledge base (28 percent).

These project leaders also report that the collaborating firms have improved their ability to use research-based knowledge and technology, and that firms have a greater probability for developing new R&D projects. All these effects relate to behaviour additionality in firms.

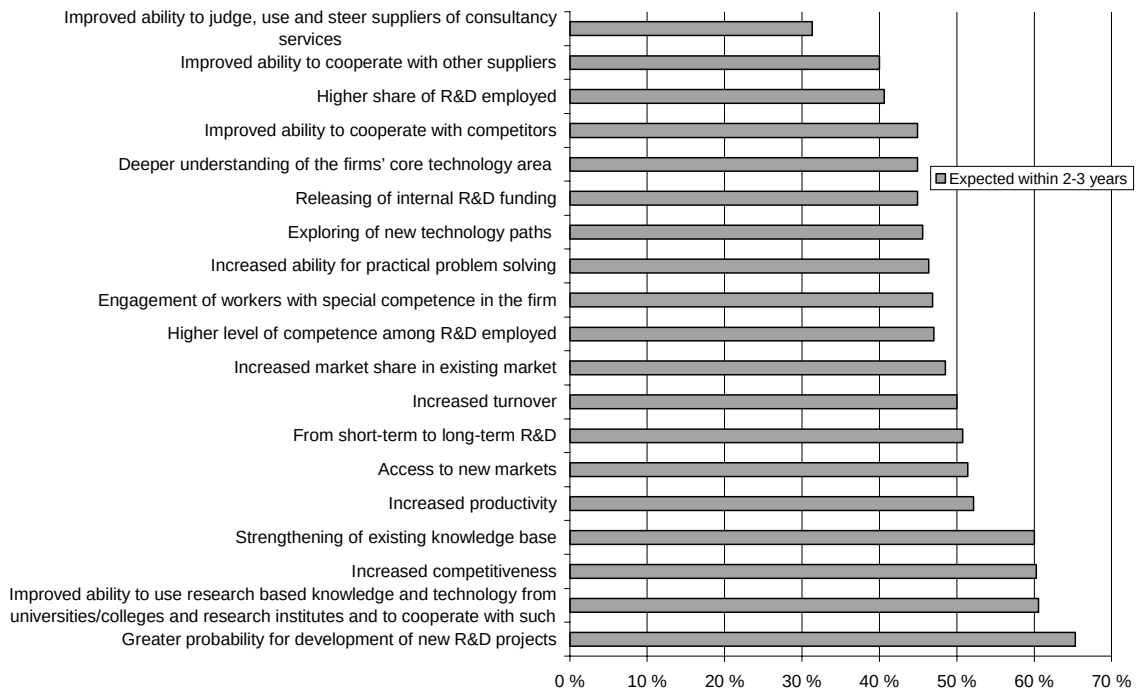


Figure 3.3.5: Share of project leaders in institutes that on behalf of collaborating firms evaluate which effects are expected in the firms within 2-3 years as a result of the project. (N=75).

Project leaders are optimistic as regards the future effects of the projects on the collaborating firms. They expect both behaviour and economic additionality in firms as a result of the specific project.

More than two thirds of the project leaders expect that there the chances of developing new R&D projects will have been improved . As many as 60 percent of the project leaders in institutes expect that firms will have an improved ability to use the research based knowledge and technology from research institutions, suggesting that the R&D project has been a gate-opener for firms towards the scientific community.

A large share of the project leaders also perceive that the projects will lead to a strengthening of the firms' own knowledge base in the future. Increased competitiveness, together with increased productivity and access to new markets, are among the more economic effects expected. Approximately half the project leaders perceive this to be expected results for the participating firms.

Table 3.3.10: Share of project leaders in institutes reporting that different modes of knowledge transfer has been 'very important' in collaboration with partners in the project. (N=76).

Types of knowledge transfer	Number of firms	Share of project leaders answered 'very important'
Practical work	72	26,4
Exchange of personnel	71	8,5
Meetings/presentations	76	64,5
Training schemes or courses	71	9,9
Written documentation such as reports, specification, technical drawings etc	73	39,7
Delivery of prototypes or finished product components	70	68,6

We also asked the project leaders what kinds of knowledge transfer there had been in the project. In the following we report the share of project leaders that perceive the different factors to be very important.

As can be seen from the table above, 69 percent report that delivery of prototypes or finished product components has been the most important mode of knowledge transfer. More than two thirds of the project leaders reports that meetings and presentations is the most important mode. Institutes also participate in practical work together with the partners, and 26 percent of the project leaders perceive this as being 'very important'.

Table 3.3.11 Number of industrial results, by type, for the project as a whole, absolute numbers and average. (N=46).

	Total	Average
New patent applications	5	0,1
License contracts	0	0,0
New prototypes	10	0,2
New products	52[24]	1,1
New processes	34	0,7
New establishments	3	0,1
Total	104	2,3

46 project leaders answered the question ofnwhat kinds of industrial results the project as a whole had already achieved. The table above gives a total number of 104 industrial results reported by the 46 project leaders that have answered this question, giving in average 2.3 results per project.

The greatest numbers are found in new products and processes, in average 1.1 and 0.7 per project. The project leaders report few other results achieved by the institutes and its co-operating partners.

[24] One institute reported 30 new products as a result of the project.

Table 3.3.12: Number of scientific results by type, for the project as a whole, per project. (N=70).

	Number of project leaders that report scientific results	Number of scientific results
PhDs delivered	7	9
Scientific articles in referee periodicals	16	42
Reports or articles in other disciplinary periodicals	40	118
Books etc	6	45
Presentations of scientific work at international conferences	40	120
Total	-	334

We asked the project leaders whether he/she on behalf of the project as a whole, could give the numbers of scientific results achieved per project and 70 project leaders answered this question. Out of these 70, only a small share answered that they had received any scientific results from the project at this time.

The largest number of project leaders answer there has been produced reports and articles, and presentation of scientific work at conferences at this stage. The projects have resulted in as many as 118 reports/articles and 120 presentations. Some project leaders report scientific articles in referee periodicals (42), and some report books (45).

3.3.3 Project leaders in institutes evaluating RCN

This section presents the results of how the project leaders in the institutes evaluate the role of RCN in the project.

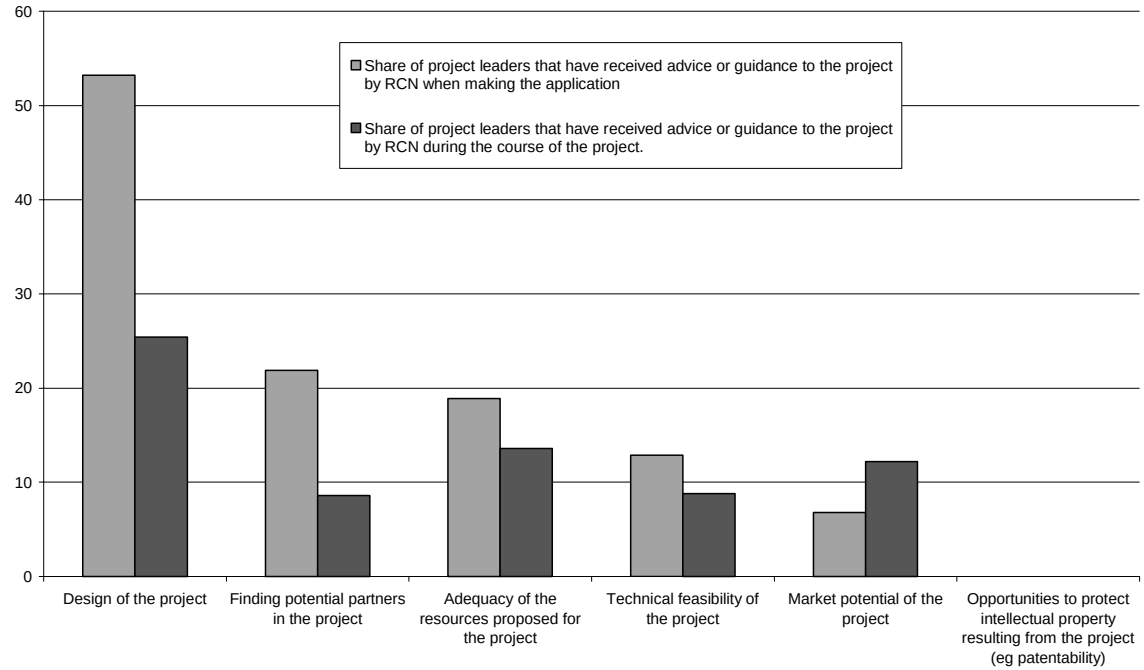


Figure 3.3.6: Share of project leaders that have received advice or guidance to the project by RCN when making the application (N=79), and/or during the course of the project (N=63).

We asked the project leaders to answer the question whether the projects had received advice or guidance by RCN, either when making the application or during the course of the project. The project leader was given three alternatives, yes, no or 'do not know'. The figure shows the share that answered 'yes'.

A large share of project leaders answer that they had received some help 'when making the application'. The RCN has particularly been helpful with guidance in relation to the design of the project (53 percent). Moreover, one fifth of the project leaders say that before project start-up the RCN had been helpful in finding potential partners in the project. During the course of the project, RCN also played a role for some institutes as regards the continuing design of the project (25 percent). Few institutes report on other forms of advice or guidance during the course of the project.

Table 3.3.13: Share of institutes that after the end of the project report RCN's role. (N=52).

Have you received help to	Yes	No	Uncertain
...develop the project further?	21,2	73,1	5,8
...exploit opportunities available from other business and technology support agencies(e.g. SND, Eksportrådet)?	8,2	83,7	8,2
...spread the scientific results from the project	17,0	63,8	19,1

We asked about what role the RCN played after the end of the project. Few institutes report that RCN have any of the three roles depicted in the questionnaire. Looking at the table, the largest share of the respondents answered that the RCN had provided

help with developing the project further (21 percent). 17 percent of the institutes report that the RCN had helped in spreading the scientific results from the project, while only 8 percent reported that RCN have had a role in exploiting opportunities available from other business or technology support agencies like SND or the Export Council. The different types of institutes do not seem to differ in how they perceive RCN's role in this respect.

Table 3.3.14: Share of project leaders in institutes that on behalf of the project as a whole, evaluate RCN's help with establishing dialogue and networks with external actors in connection to the project. (N=80).

	Dissatisfied	Neutral	Very satisfied	Not relevant	Total
Other companies	20,3	22,8	10,1	46,8	100
Consultants	24,4	12,8	2,6	60,3	100
Public sector	18,8	20,0	6,3	55,0	100
Research institutes	21,3	22,5	6,3	50,0	100
Universities and colleges	22,8	16,5	8,9	51,9	100

We asked the project leaders to assess RCN's role in establishing dialogue or network with various partners in connection with the project, on behalf of the project as a whole.

The largest share of project leaders answered 'not relevant' to the question, suggesting two alternative explanations: there is no need for dialogue or networks, or they do not feel that this is a task for the RCN. However, if one looks at the share of institute based respondents that were very satisfied with the role of RCN, the largest share were actually satisfied with the establishment of dialogue and network towards other companies, suggesting that for some institutes the RCN has in fact played an important role as a bridge builder between institutes and firms.

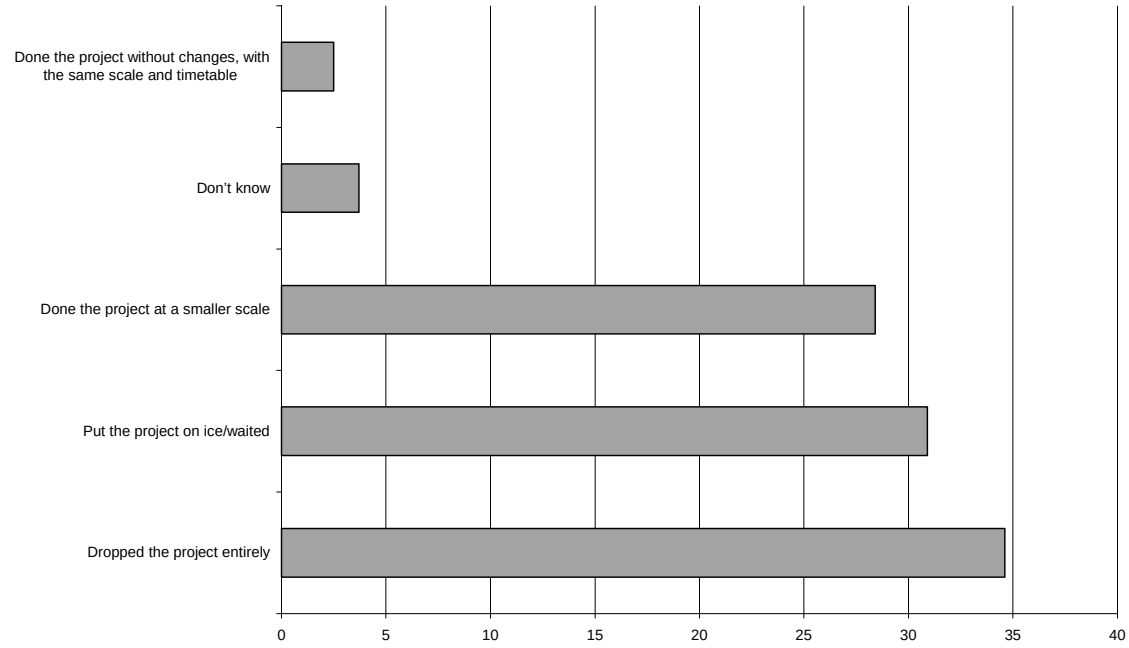


Figure 3.3.7: Share of project leaders in institutes that report on 'what would have happened to the research project if RCN had not funded it'. (N=81).

We asked the project leaders what they suspected would have happened to the projects if the RCN had not funded it.

Hardly any of the institute based project leaders (3 percent) believe that the projects would have been carried unaltered without the RCN support. More than two thirds of the projects would have been dropped entirely, a proportion that is larger among research institutes than among university/college institutes.

As many as 31 percent of the project leaders would have put the project on ice/waited if there had been no RCN funding. Some institutes would also have done the project on a smaller scale (28 percent).

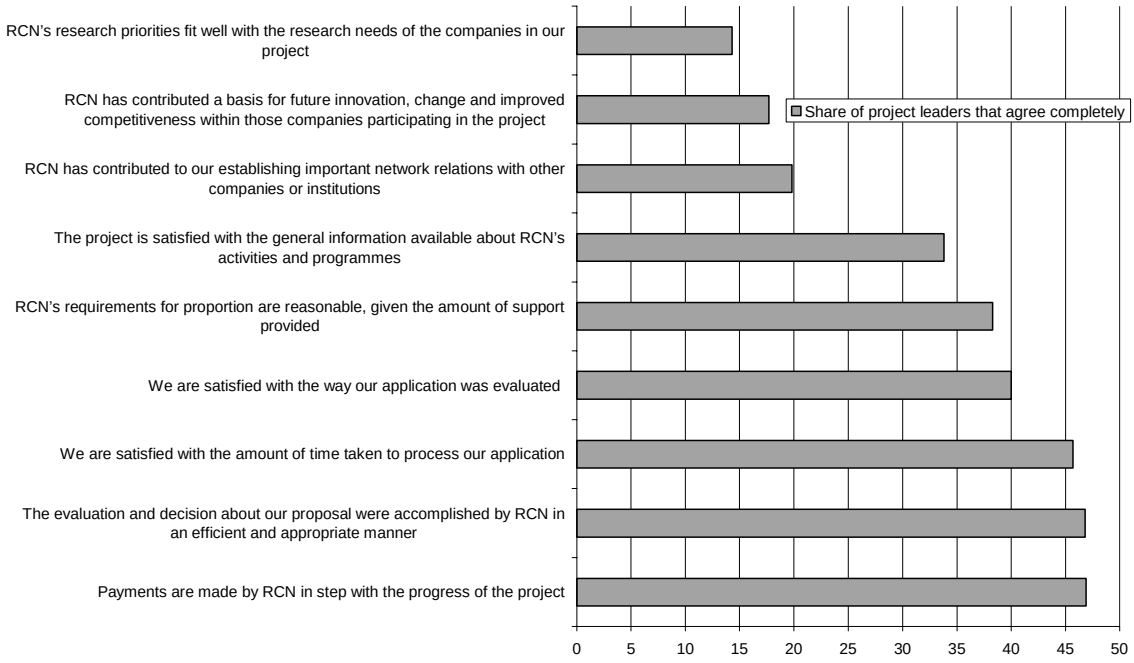


Figure 3.3.8: Shares of project leaders that completely agree with the given statements(N=81).

We asked the project leaders to respond to different characteristics of the RCN. The figure above gives the shares of respondents that answered that the characteristics were 'most appropriate'.

Close to half the institutes totally agree with the statement that the RCN payments are in sync with the progress of the project, and that they are satisfied with the time it takes to process the application.

Few project leaders agree (14 percent) with the statement that the RCN's research priorities fit well with the research need of the companies in the specific project, suggesting that the RCN must be more open to companies' R&D demands when designing programs for user oriented research.

Surprisingly few institutes believe that the RCN has contributed to a basis for future innovation, change and improved competitiveness within the companies participating in the projects. This contradicts the findings related to the effects of the projects (see previous section on achieved and expected effects). Furthermore, few institutes agree that the RCN has played a role in establishing important networks with other firms or institutions.

We asked the institute based project leaders whether he/she could state what the RCN could do to improve services.

As many as 59 percent of the project leaders answered this question. Some project leaders use the opportunity to report their satisfaction with RCN, others that there are potentials for improvement. Some project leaders request more long term and stable finance to the institutes. Others comment on how RCN handles applications, the most general comment being that procedures are too bureaucratic, and that institutes

require faster feedback. One project leader reported that he/she wanted the RCN to be more concrete when rejecting applications, making it possible to improve the application and learn from what went wrong with previous applications. Some institutes also require more professional help during the course of the project.

When it comes to the RCN's role as 'networker', one project leader wished that RCN could engage more in network building, while two project leaders were quite certain about the opposite; RCN should not use scarce R&D resources on networking.

3.3.4 Summary

Most respondents in this survey are project leaders working in a research institute, being in charge of a user oriented project where the institute is the contract partner with the RCN. The largest share of the projects is to be found in programs related to the maritime sector (22 percent) and to ICT (19 percent). The largest share of project financing is linked to applied research (55 percent in average).

The respondents' most important source of income is funding from Norwegian firms and the RCN. In average Norwegian firms contribute to 43 percent of total income among our respondents, while RCN accounts for 23 percent. Our data shows that more than half the institute funding from Norwegian firms comes from companies with more than 250 employees. University or college institutes receive the largest shares of income though the RCN and the institutes themselves.

Project leaders in institutes report that the most important general form of diffusion of project results *to firms* are reports. In addition one finds technological development and collaboration with customers, indicating real interaction. This applies however, only to half of the respondents.

When *the public sector* is the client, the most important form for diffusion continues to be reports and/or documents. However, fewer institutes report collaboration and technical development as a form of knowledge distribution to the public sector.

According to the project leaders, the institutes themselves in general play the most important role in the different stages of the projects (initiation, defining research question, project development, start-up and evaluation). Firms play a role mostly when it comes to defining research questions and when evaluating the whole project.

As a result of the project, a large share of institutes report that they have already achieved competence building.

Institutes have positive expectations to the future effects of the project; both regarding the development of new technologies and the establishment of collaboration with new partners.

When project leaders in institutes are asked to evaluate effects on behalf of collaborating firms, in general they report that firms have achieved few effects. The ones that report on achieved effects in firms evaluate the strengthening of the firms' existing knowledge base to be the most important one of the relatively few achieved effects. However, project leaders are optimistic as regards the effects the project will have on collaborating firms in the future.

When reporting on collaboration knowledge transfer, institute based project leaders report that delivery of prototypes or finished products components and meetings and presentation are the most used modes of knowledge transfer. This indicates that there is not much interaction in the project.

The project leaders report many results from the projects, in total 104 industrial results, and 334 scientific results.

The RCN has played a more important role under the preparation of the application than during the course of the project. The most important form of guidance or advice is linked to the design of the project. Few project leaders report that the RCN has played a role after the end of the project. Neither has it helped much with establishing dialogue and networks.

Few project leaders believe that the projects would have been carried out without changes, if they had not received RCN funding. Approximately two thirds would have dropped the project entirely or put the project on ice.

Institute based project leaders are in general satisfied with the payment routines and with the evaluation and the amount of time taken to process the application. However, institutes are not so positive to the contribution that RCN has given firms. Few of these project leaders evaluate that the RCN has contributed to a basis for future innovation, change or improvement for those companies participating in the project. Nor do they feel that the RCN's research priorities fit well with the research needs of the companies in the project.

Chapter 4. Survey of Provis/Foriss data

4.1 Introduction[25]

One major problem facing us when preparing this report is the lack of data considering user driven R&D as a whole, including figures from both of the relevant divisions of the RCN, the Bio-production and Processing Division (BF) and the Industry and Energy Division (IE). BF does use the Foriss database, and to a limited extent the Provis database. Nevertheless, BF does not to the same extent produce comparable statistics of a sufficient quality.

Given the limited resources available, we have decided to focus on the IE programs in this part of the report. If BF data are included, this will be noted. Furthermore, as the IE data can only be considered comparable from 1998 onwards, we have decided to concentrate on recent data.

4.2 General information

4.2.1 Total IE portfolio

Industry and energy's total portfolio was close to NOK 1.8 billion in 2000. Industry financed 63 percent of this (NOK 1.1 billion). Hence each krone financed by the RCN gave an additional 1.7 kroner from industry.

Table 4.2.1: IE budget 2000 per December 2000. NOK 1000.

Sector	Total available budget 2000	Total spending 2000	Spending as % of available budget
ICT and service society	196 071	181 341	92,5 %
Natural and energy resources	148 001	137 381	92,8 %
Maritime and offshore	85 993	84 311	98,0 %
Biological resources /food	26 371	26 002	98,6 %
Other landbased industries	104 910	99 256	94,6 %
Knowledgebase	16 772	15 024	89,6 %
Total user oriented R&D	**578 117**	**543 315**	**94,0 %**
Networking and innovation systems	103 982	94 467	90,8 %
Total productivity	24 535	21 416	87,3 %
Total innovation measures	**128 517**	**115 883**	**90,2 %**

Source: RCN IE

Although IE figures give a fairly good impression of RCN User driven research, they do not include data for the Bio-production and Processing Division (BF). The following table, which shows total R&D expenses – not only RCN funding – includes BF data. Note: These numbers are for 1999, not 2000.

[25] Sources: Foriss and Provis data, and IE annual reports 1994 to 2000.

Table 4.2.2 Total costs user- oriented programs 1999, IE and BF, NOK mill.

	Total project costs	Financed by		RCN as % of total	Other sources specified		
		RCN funding	Other sources		Company investments	Other private sources	Other public sources
Delivery ind. to the energysector	220.7	72.6	148.2	32.9%	94.5	49.5	4.2
ICT and manufacturing	498.6	170.1	328.5	34.1%	301.9	23.6	3.0
Maritime activities	178.2	54.2	124.0	30.4%	94.3	25.3	4.4
Processindustry	316.7	96.1	220.6	30.3%	212.5	7.3	0.8
Construction	98.8	32.5	66.4	32.8%	55.8	6.2	4.3
Bio- and food production	129.8	74.1	55.7	57.1%	55.6	0.1	
Services	137.1	66.8	70.3	48.7%	55.4	11.7	3.2
Branch independent measures	253.6	138.0	115.7	54.4%	89.6	22.8	3.4
Total	1833.6	704.3	1129.3	38.4%	959.6	146.4	23.3

Source: RCN *Årsrapport 1999 II, p. 50.*

4.2.2 Commissions for R&D, R&D institutions

In 2000 the user oriented programs of IE generated R&D commissions to institutes, universities and colleges for NOK 500 million (77 percent of IE budget).

Table 4.2.2: Total costs, IE contribution and industry commissioning of R&D services from Norwegian R&D institutions (institutes, universities and colleges) 2000. NOK million.

Sectors	Total costs	out of these RCN funding	Industry commissions of R&D from R&D-institutions	R&D investments in % of	
				Toal costs	RCN-funding
ICT and service society	520,8	181,3	109,0	20,9 %	60,1 %
Natural resources and energy	421,7	137,4	193,7	45,9 %	141,0 %
Maritime and offshore	272,0	84,3	36,2	13,3 %	42,9 %
Biological resources / Food	83,9	26,0	21,9	26,1 %	84,1 %
Other landbased industries	293,2	99,3	107,2	36,6 %	108,0 %
Knowledgebase	15,7	15,0	0,2	1,0 %	1,1 %
Total user oriented R&D	**1 607,1**	**543,3**	**468,1**	**29,1 %**	**86,2 %**
Networking and innovation systems	121,6	94,5	32,0	26,3 %	33,9 %
Total productivity	47,6	21,4	9,6	20,3 %	45,1 %
Sum innovation measures	**169,3**	**115,9**	**41,6**	**24,6 %**	**35,9 %**
Sub total	**1 776,4**	**659,2**	**509,7**	**28,7 %**	**77,3 %**

Source: RCN IE

4.2.3 Projects

In 2000 IE initiated 400 new projects, claiming 33 percent of IE's total investments this year (NOK 234 million). The average size of all IE projects was approximately NOK 933,000, being on the same level as in 1999.

54 percent of the projects have an annual funding of more than NOK 500,000, 27 percent more than NOK 1 million. 27 projects received more than NOK 3 million.

Table 4.2..3: IE allocations 2000 according to project size. Number and NOK mill.

Allocation	Number of projects 2000			Allocations (NOK mill)		
	R&D projects		Other	R&D proejects		Other
	Main project	Pilot project	projeects	Main projects	Pilot projects	projects
Less than NOK 100,000	27	16	20	1,6	0,8	0,9
NOK 100,000 - 299,999	131	52	33	25,7	8,2	5,7
NOK 300,000 - 499,999	140	21	18	53,1	7,3	6,2
NOK 500,000 - 999,999	182	8	21	126,6	5,6	14,0
NOK 1,000,000 - 2,999,999	147		11	226,7		16,9
More than NOK 3 mill.	27		1	176,7		5,2
Total all projects 2000	**654**	**97**	**104**	**610,4**	**22,0**	**49,0**
Total all projects 1999	660	128	108	615,0	19,8	42,5
Average project size						
Project allocations 2000				0,933	0,226	0,471
Project allocations 1999				0,930	0,150	0,390

Source: RCN IE

Table 4.2.4: Comparison IE allocations 1997 and 2000 according to project size. Number and NOK 1000.

Project size	R&D projects (1) 97 No		R&D projects (1) 97 Allocation		R&D projects 00 No		R&D projects 00 Allocation	
	No	%	NOK 1000	%	No	%	NOK 1000	%
Less than NOK 100,000	127	13 %	7 321	1 %	43	6 %	1 605	0 %
NOK 100,000 - 299,999	271	29 %	48 566	7 %	183	24 %	25 720	4 %
NOK 300,000 - 499,999	146	15 %	53 547	8 %	160	21 %	53 077	9 %
More than 500.000	404	43 %	590 912	84 %	365	49 %	529 965	87 %
Total all projects	**948**	**100 %**	**700 346**	**100 %**	**751**	**100 %**	**610 367**	**100 %**

1) Incl. scholarships, Source RCN IE/STEP

More than 1500 Norwegian companies took part in IE projects in 2000 (including the BRO/BRIDGE program of 457 projects). 385 of these 1500 companies participated as contract partners, and out of these some two thirds were small and medium sized companies.

As many as 70 percent of the *co-operating* companies *(samarbeidsbedrifter)* were SMEs. More than 1000 SMEs took part in one or more of the IE projects in 2000.

Table 4.2.5: Participating Norwegian companies IE user-oriented programs 2000 (BRO/BRIDGE projects not included), number of employees, percentage of n companies.

Number of employees	Number of companies	Percentage
0 – 1	17	2%
2 – 5	74	7%
6 – 20	146	14%
21 – 50	185	18%
51 – 100	161	15%
101 – 250	193	18%
251 – 500	133	13%
> 500	144	14%

Source: RCN IE

The fact that as many as 1500 companies are involved in IE projects, means according to IE, that the majority of the companies classified as 'R&D performers' *(FoU-utførende)* by Statistics Norway takes part in one or more of IE's user oriented projects. In 1999 Statistics Norway counted 1474 branch units investing in R&D.[26]

In addition one find some 600 participants from the R&D-sector (universities included), the public sector, private organisations and foreign institutions and companies, giving a total of 2100 participants in 2000. 67 percent of these can be classified as small and medium-sized companies.[27]

Each project has 5 participants in average.

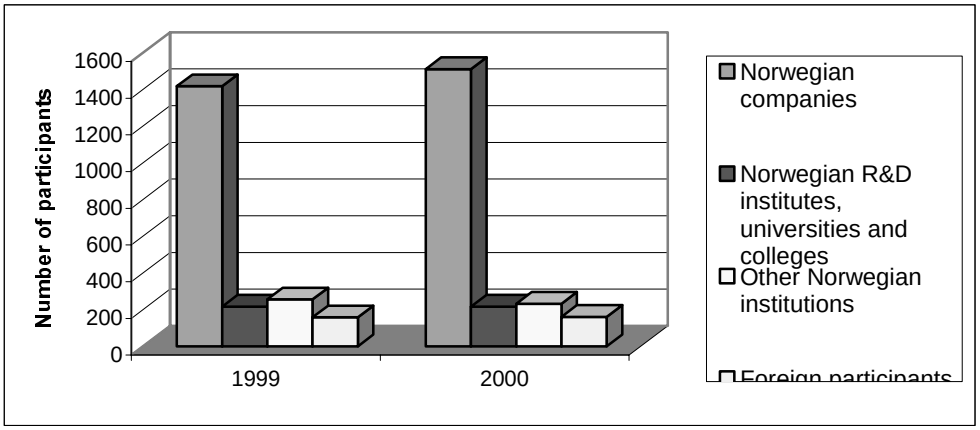
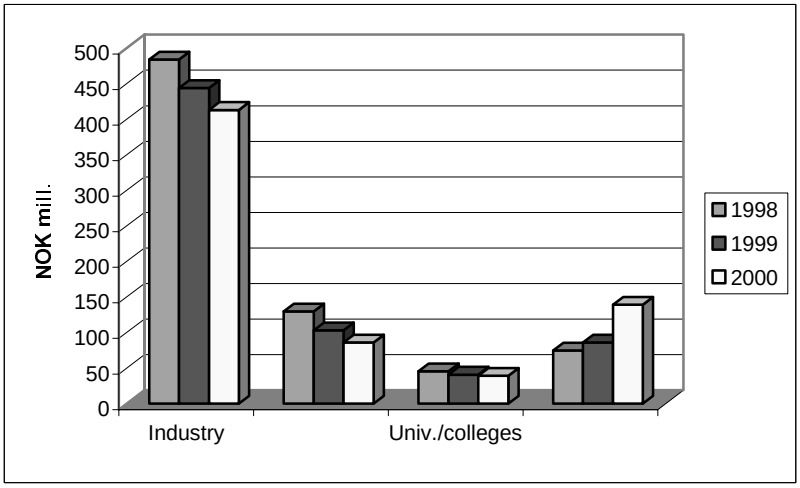


Figure 4.2.1: Number of participants in IE projects 1999 and 2000 (Source RCN/IE)

61 percent of the IE project contracts partners are firms, 13 percent R&D institutes and 6 percent university and college units (2000). This leaves some 20 percent to the 'other institutions' category, which mainly consists of industry branch organisations and other organisations.



[26] There can be more than one company *(bedrifter)* in a corporation *(foretak).* Statistics Norway defines branch units *(bransjeenhet)* as all companies that are part of a corporation within the same branch of industry *(næringsgruppe)*. Unfortunately the RCN IE definition of a 'company' or a 'branch unit' is not that clear-cut. RCN participants are according to IE a mix of companies and corporations. Moreover, Statistics Norway includes no companies with less than 10 employees, RCN does.

[27] SME=company with less than 100 employees.

Figure 4.3.2: IE allocations 1998 – 2000 according to types of contract partners. NOK mill. (unadjusted prices). Source: RCN/IE.

4.2.4 Geographical distribution

The geographical distribution of IE funding is quite close to the distribution of industrial R&D in general.

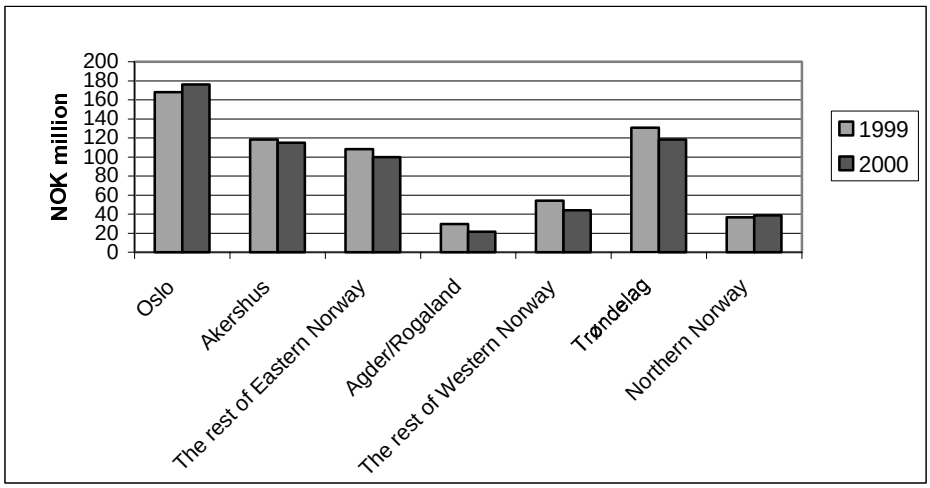


Figure 4.2.3: Allocations 1999 and 2000, geographical distribution of formal project contract partners. NOK mill, unadjusted prices. Source: RCN/IE.

Please note that this figure represent formal contract partners. One weakness with the RCN IE data is that it is very difficult to get a clear picture of the distribution of the total number of participants, co-operative partners included. This is mainly due to lack of 'markings' in the Provis and Foriss databases.

4.2.5 Networks

Table 4.2.6. RCN/IE user oriented R&D projects based on networks (BRIDGE/BRO not included) 2000. Total number of projects 790. Projects may include co-operation of more than one type.

Co-operation between…	Number	Percentage
Norwegian company and Norwegian research institute	343	43%
Norwegian company and Norwegian university/college	182	23%
Several Norwegian companies	344	44%
Norwegian company and foreign R&D institution	19	2%
Norwegian company and foreign company	42	5%
Norwegian company and other types of co-operation partners	195	25%
Projects with one participant only (no network)	248	31%

Source RCN/IE.

RCN is primarily interacting with its project contract partner. However, other participants may take part as co-operative partners *(samarbeidspartnere).*

In 2000 344 of the projects were based on co-operation between Norwegian companies (44 percent). 343 consisted of networks of a Norwegian company and a

Norwegian R&D institute (43 percent), while 182 (23 percent) included a Norwegian company and Norwegian university/college units.

Only 2 percent were based on interaction between a Norwegian company and R&D institutions abroad. Nevertheless, as many as 49 percent of the IE R&D-projects could report some kind of international collaboration. 32 percent of the IE funding was allotted to projects where companies co-operated with foreign firms or R&D institutions.

Table 4.2.7: Allocations in 1999 and 2000 to R&D projects that are part of some kind of international co-operation.

	No		Allocation (NOK mill.)	
	1999	2000	1999	2000
Projectst attached to projects financed by EU	37	30	30,6	24,3
EU pilot projects / EU mobilisation	91	54	10,7	6,9
EUREKA- projects (pilots included)	20	22	14,4	16,1
Nordiske samabeidsordninger	7	8	3,3	6,0
Other measures for international co-operation	19	14	31,0	28,4
Other [1)]	258	250	213,6	227,5
Total projects with an international component	432	378	303,6	309,2
Proportion of total number of IE projects/budget.	47 %	49 %	47 %	47 %

1) Mainly co-operation between Norwegian companies and companies/R&D institutions abroad.

Source: RCN IE

4.2.6 Budget reductions

IE's total budget has been reduced from some 800 million kroner in 1993 to 670 million in 2000 in real terms (2000 currency, a reduction of 16 percent). Total activities have been reduced by 33 percent in real terms compared with 1994.

In 1994 the User oriented programs amounted to NOK 552 mill. In 1995 the User oriented programs was 547 mill, in 1996 625 mill, in 1997 694 mill, in 1998 604 mill, and in 1999 505 mill. (nominal prices). Innovation measures and 'branch independent measures' *(bransjeuavhengige tiltak)* are not included. As one can see the investments in user driven R&D declined quite dramatically from 1997 to 1999.

From 1999 to 2000 the budget increased with 1 percent, which may be interpreted as the first confirmation of the new R&D-oriented trend in Norwegian knowledge policies.

Table 4.2.8: Total project costs (industry investments included) in IE portfolio 2000. NOK 1000.

Sector	Total project investments 2000	financed by RCN -1	financed by Other sources	RCH as% of total cost	Specification of other sources: Participant's own invest-ments	Specification of other sources: Other private sources	Specification of other sources: Other public funding
ICT and service society	520,8	181,3	339,4	34,8 %	284,9	44,3	10,3
Natural resources and energy	421,7	137,4	284,3	32,6 %	252,6	24,6	7,1
Maritime and offshore	272,0	84,3	187,7	31,0 %	112,5	70,1	5,0
Biological resources / food	83,9	26,0	57,9	31,0 %	57,9		
Other landbased industry	293,2	99,3	194,0	33,8 %	174,4	16,6	3,0
Knowledgebase	15,7	15,0	0,6	95,9 %	0,6		
Total user oriented R&D	**1 607,1**	**543,3**	**1 063,8**	**33,8 %**	**882,9**	**155,5**	**25,4**
Networking and innovation systems	121,6	94,5	27,2	77,7 %	14,5	10,5	2,2
Total productivity	47,6	21,4	26,2	45,0 %	11,9	11,5	2,8
Total innovation measures	**169,3**	**115,9**	**53,4**	**68,5 %**	**26,4**	**22,0**	**5,0**
Sub total	**1 776,4**	**659,2**	**1 117,2**	**37,1 %**	**909,3**	**177,5**	**30,4**

[1)] Incl. private investments channeled through RCN

Source: RCN IE

4.2.7 Additionality

One important measure of the success of user driven research is its additionality, i.e. its ability to bring forth efforts, results and effects that would otherwise not have taken place. If the companies would have implemented these projects in the same form anyway, without the help of RCN, the IE programs could be considered a waste of the taxpayers' money.

Additionality is judged on a scale from 1 to 7:

- **Score 1 to 3:** RCN support is of little or no relevance to IE priorities and/or the project will not be influenced by RCN support.
- **Score 4 to 5:** Support will be of great importance, and may lead to positive effects as regards IE priorities.
- **Score 6 to 7:** The project would be fundamentally changed without support. Support may lead to considerable positive effects as regards IE priorities, and/or support could be decisive for the success of a newly established firm/enterprise.

In 2000 three percent of the projects scored 1 to 3, 64 percent scored 4 to 5 and 33 percent scored 6 to 7.

One should be aware of the fact that RCN filters out many project proposals even before they receive an application, as there often are discussions between RCN officials and company representatives during the preparation of the application. Moreover, these numbers reflect the *expected* additionality of the projects, not the final results.

The additionality for larger R&D-projects is normally much higher than for small, in the same way as long-term projects are expected to bring a higher additionality than short-term ventures.

4.2.8 Risk profile

The authorities have signalled that they would like RCN and SND to increase the risk factor, meaning increasing the chances that the projects will *not* succeed. This may sound like a paradox, but the policy is linked to the need for additionality. Companies will often avoid high-risk projects, as the potential losses are too high. This may lead to an under-investment in truly innovative ideas.

One way to legitimate public investments in user driven research is to finance high-risk projects. A larger proportion of these will fail (which may give a bad impression in RCN and Government reports). On the other had: The projects that do succeed will often lead to more radical innovations that may have a greater effect as regards profitability and spin-offs. This way of reasoning applies mainly to technological risk. It is harder to argue that the RCN should accept higher risks in the areas of market conditions and economic governance.

IE has considered three types of risks in its 2000 portfolio:

- *Technological risk:* The chances that a supported project will fail of technical reasons.
- *Market risk*: The chances that the industrialised result will fail in the market, due to non-controllable factors (e.g. competing projects, regulations, environmental regulations, fashion etc.)
- *Economic risk*: The chances that the company will not survive economically if the project or the exploitation of results fail.

The risk factor is considered significant *(betydelig)*, noticeable *(påviselig),* or insignificant *(ubetydelig)*.

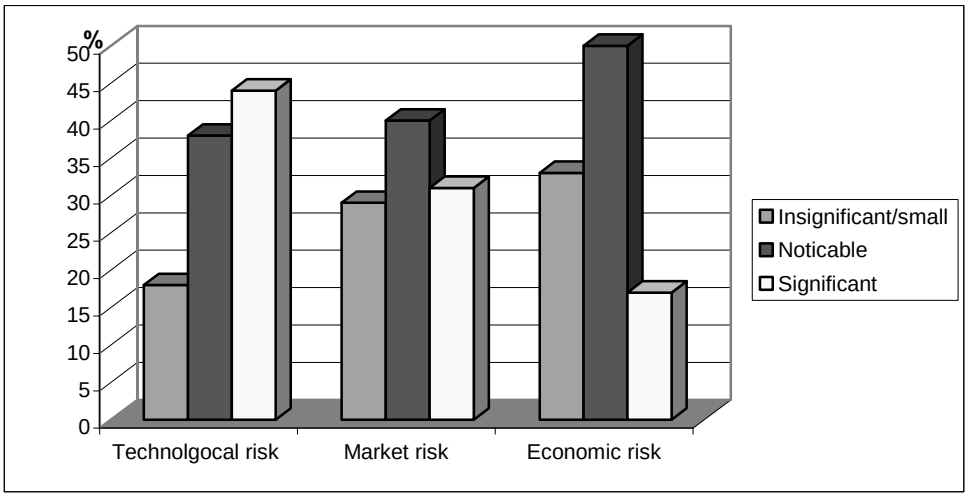


Figure 4.2.4: IE project portfolio 2000, sorted according to risk (percentage).

82 percent of the IE portfolio are considered to be technologically risky projects (noticeable/significant risk). 18 percent are considered not risky (insignificant risk). It should be noted, though, that IE has added all projects where technological risk is considered irrelevant to the latter group.

Large companies with a strong capital base normally face a low economic risk in any case, which is why the economic risk factor is lower than the other two types of risk.

4.2.9 Economic and social returns

The projects have also been evaluated as regards economic benefits for the company, social use, research content and time allocation.

- *Economic benefits for the company*: To what extent does RCN support influence the economic returns of the projects for the participating companies? This applies to economic returns, earlier production, improved products and processes, or long-term effects like competence building and networking. Hence it is not the economic returns from the project in itself that is measured, but the economic value the companies would loose it they did not take part in the projects.
- *Social economic returns*: To what extent do the projects benefit society beyond the profit and benefits earned by the participants? Most R&D projects will have some social effects. The idea here is to pinpoint the *additional* effects caused by RCN support.
- *Research content*: To what extent is the research content influenced by RCN support? Again we are talking about a 'what if' argument. If the RCN support had not been there, would that have reduced the number of doctorates, articles, the involvement of R&D institutions etc.?
- *Time delay (Tidsforsering):* Does RCN support lead to earlier results? In order to qualify for additionality the project must have met certain deadlines set by public regulations, market conditions, social needs etc.

As one can see from the figure below, the RCN data indicates medium to high additionality in all areas, although the effects is most significant in the areas of R&D content and time delay.

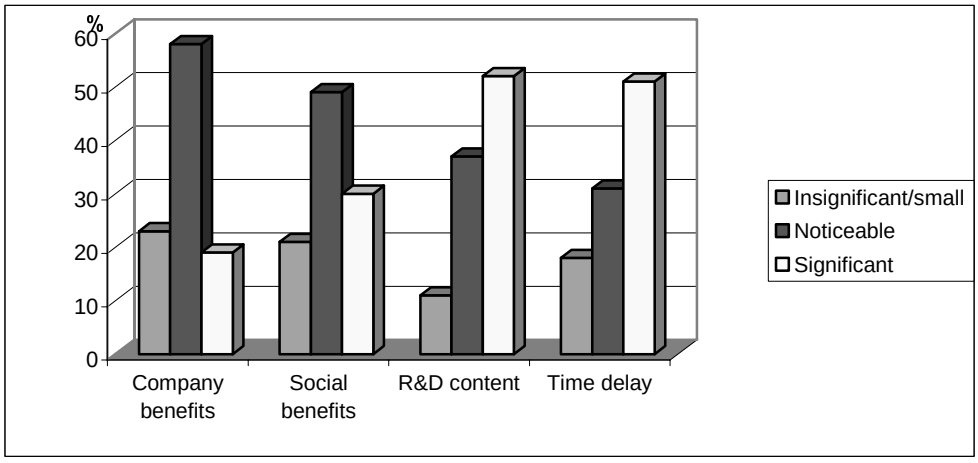


Figure 4.2.5: IE project portfolio 2000, evaluation criteria (percentages). Source RCN/IE.

4.2.10 Scientific and industrial results

In order to control the scientific and social effects of IE programs, IE has sent out a separate questionnaire to all projects.

There was a 91 percent response rate, compared to 74 percent in 1999. The lower response rate of 1999 is reflected in the numbers below. One explanation for the increase in reported items may be the fact that many R&D programs are in their final stages, and one should expect more scientific 'production' near the end of a program.

User oriented programs produced 318 articles in periodicals with referees in 2000 and an additional 259 articles in other publications of relevance for the discipline, technology or industry. Moreover, the activities resulted in 53 books and 735 lectures at international conferences.

Table 4.2.9: Scientific results and dissemination IE programs 2000

Version of March 22 2001 **Sector**	Scientific articles with referee	Articles in other scientific and technical periodicals	Other reports, lectures from scientific and technical meetings	Books etc.	Lectures at internatio-nal confe-rences	Dissemination to society	Dissemi-nation to users	Information in the media
Useroriented R&D								
ICT & service society	43	48	481	2	229	94	402	102
Natural res. and energy	95	117	613	14	226	81	284	275
Maritime/offshore	24	25	240	4	72	25	230	41
Bioproduction and food	98	4	135	4	49	25	38	84
Landbased industries	50	60	674	29	154	56	456	70
Knowledgebase	8	5	10		4	1	12	4
Total	318	259	2 153	53	734	282	1 422	576
Innovation measures								
Networking and innovation	3	11	76		12	128	716	268
Total productivity	25	44	202	15	31	44	172	22
Total productivity	28	55	278	15	43	172	888	290
Total 2000	**346**	**314**	**2 431**	**68**	**777**	**454**	**2 310**	**866**
Of which "NHD-prog"	317	228	2 197	63	694	407	2 215	676
Total 1999	235	229	1 579	45	561	352	1 198	413

Source RCN IE

As regards industrial results the user driven programs delivered 676 new and improved methods, models or prototypes, 75 registered patents and 57 signed licence agreements. The number of new products, processes and services were reported to be 558.

The user driven programs led to the establishment of 40 new companies and 74 instances of new business activities within existing firms.

Table 4.2.10: Industrial results reported from IE programs 2000.

Sector	New and improved methods models prototypes	Regist. patents	Licence agree-ments	New or new and improved			New firms establish.	New business activity in exist. firms	Firms participating actively in project	Firms not participating actively
				Products	Processes	Services				
User driven R&D										
ICT & service society	162	16	25	59	24	41	12	21	84	35
Natural res./energy	165	20	11	35	25	29	5	15	288	225
Maritime/offshore	91	7	11	37	24	22	3	16	33	11
Bioo/food	40	18	7	23	7		3	5	2	5
Landbased industry	217	14	3	120	74	38	17	17	86	114
Knowledgebase	1									
Total	676	75	57	274	154	130	40	74	493	390
Innovation measures										
Network/innovation	108	34	17	75	55	43	50	4	121	
Total productivity	13			4	17	2		1	27	
Total	121	34	17	79	72	45	50	5	148	0
Total 2000	**797**	**109**	**74**	**353**	**226**	**175**	**90**	**79**	**641**	**390**
Of this "NHD-prog"	771	108	66	340	217	169	90	70	363	170
Total1999	646	96	27	390	234	150	21	83	259	407

Source RCN IE

4.2.11 PhD/doctoral candidates

IE financed 239 PhD candidates in 2000. The projects report 205 R&D PhD man-years, out of which 49 (24 percent) were performed by women (compared to 22 percent in 1999). 44 candidates got their diploma in 2000. 9 of these were women.

Compared to 1998 the number of doctorate candidates has been reduced, mainly because of lack of funding. The PROSMAT program is responsible for a large part of IE researcher education (some 30 percent). In 1999 94 candidates were funded with PROSMAT support. Due to budgetary restraints this number was reduced to 61 in 2000.

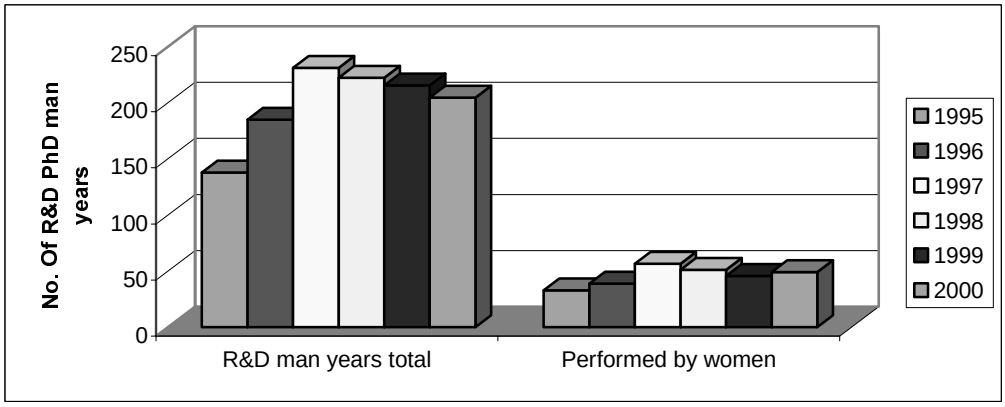


Figure 4.2.6: Number of R&D PhD man years, all IE programs 1995-2000. Source: RCN/IE.

Chapter 5. Previous evaluations

5.1.1 Summary

We have reviewed some of the already existing studies of RCN User driven R&D, in order to give the evaluators a broader background.

The main conclusion from an evaluation made in 1997 (Hervik/Waagø: *Evaluering av brukerstyrt forskning*, BI and NTNU, Oslo/Trondheim 1997.) is that user driven research has been quite a successful instrument in financing industrial R&D in Norway.:

- There is relatively high uncertainty regarding economic return/profitability.
- One can see significant positive effects from investments in competence building and networking.
- The programs have probably given fair social returns.
- There is too low additionally and risk in the overall portfolio.

The research institute Møreforskning has made a study of user driven research (Bræin 2001) that shows that the programs *are* important for the companies. Half of them expect economic results after two years time, and 40 percent of the companies say that these R&D projects would not have been implemented without the support of the Research Council. It also seems that public support leads to larger and more daring projects.

The social return seems to be substantial. Most important are the so-called positive externalities: competence building in companies and institutes, networking, technology diffusion. It is harder to measure the direct economic effect of the various projects. However, a small number of successful projects lead to a large overall profitability.

Please note that the Møreforskning reports referred to in this document are preliminary versions, which may be subject to change (this applies to Bræin 2000-a, 2001-b, 2001).

The technological risk profile has been considered too low. According to the Hervik/Waagø 1997 evaluation one should increase the number of companies with R&D competence and focus more on small enterprises, knowledge and technology diffusion and networking and co-operation. Universities and colleges should become more involved.

A customer survey made by the company AIM for the Research Council reveals a certain lack of administrative transparency (Verde 2000). The threshold for entering the RCN user driven ‘environment’ seems to be high, and there is little renewal in the company ‘customer base’.

5.2 The Hervik/Waagø evaluation of 1997

In February 1997 The Norwegian School of Management BI (Handelshøgskolen BI) and The Norwegian University of Science and Technology (NTNU) published the main evaluation of user driven research, on behalf of the Ministry of Industry and Trade (Hervik and Waage 1997).

The goal of the evaluation was to study to what extent user driven research fulfils its objectives and how this measure function as an industry policy instrument.

5.2.1 Main conclusions and recommendations

According to the evaluators user driven research seemed to have reached its objectives in the period 1990 to 1995. The research had indeed been 'user driven', with the firms laying down the basis for the activities.

At the time the major part of the annual funding of approximately NOK 650 million was channelled through contracts with the companies (55percent), and this portion had become slightly larger during the period.

On average the R&D projects led to returns of 7 percent or more, in the form of increased income and a reduction of costs. The evaluators underlined, however, that this number is uncertain. A small number of successful projects lead to the large overall profitability.

As now, the Research Council attached great importance to networking and competence building, and indeed, the companies did report that among the very positive effects of taking part in these projects, one could find competence development and the establishment of new contacts. The R&D institutions also reported positive effects from such participation.

The evaluation team recommended that the Research Council should continue using user driven research as an instrument.

The main conclusions were listed as (Hervik and Waagø 1997, p. 1):

- There is relatively high uncertainty regarding economic return/profitability.
- One can see significant positive effects from investments in competence building and networking.
- There are significant external effects in other companies due to the development of 'knowledge capital' and R&D networks.
- There is too low additionally and risk in the overall portfolio.
- There is probably a fair rate of *social* return and profitability, although the numbers are tentative.

The report pointed out several areas for improvement, and underlined that one looked beyond the demand for direct economic returns. The R&D content and the risk profile is important, as is competence development and networking.

In order to increase the efficiency of the measure, the evaluators recommended that one should develop 'more open arenas for competition' and a system for 'strategic

portfolio management', including better routines for governance and management by objectives *(mål og resultatstyring)* and a more standardised system of evaluation.

5.2.2 Use of funding

The evaluators found that the research councils had used 4 billion kroner in the period from 1990 to 1995, which equals some 650 million kroner annually. The sum represents approximately 13 percent of industrial R&D and 5 percent of the total R&D investments in Norway in this period.

55 percent of the funding had been channelled to companies being contract partners, 35 percent to institutes and industry organisations and some 10% to universities and colleges. About 5.5 percent covered administrative costs in the research councils.

The number of company contracts did increase somewhat during the period and the share was close to 50 percent around 1990/91. It should be noted that some of the funding going to industry branch organisations (*bransjeorganisasjoner*) ultimately reached companies, as did some of the money channelled to research institutes (cp. programs like TEFT, FORNY and RUSH). In the same way research institutes might have delivered research to industrial contract partners, Hervik and Waage found that 55 percent of R&D activities being part of user driven programs was done by companies.

The report adds that 'One clear conclusion seems to be that one has not followed up the intention from the definition of user driven research – i.e. that companies are to be contract partners – in a coherent way (…). Compared to the eighties the proportion of company contract partners has increased significantly.'

5.2.3 Company size

Hervik and Waagø found that 50 percent of the funding was given to companies with more than 250 employees, 20 percent to those with between 50 and 250 employees, and 30 percent to firms with less that 50. However, like STEP, Hervik and Waagø did not include programs like TEFT, FORNY, RUSH and the NT-program (i.e. general programs targeting innovation capabilities, competence building and networking). Even at that time the Research Council gave priority to small companies in these particular programs.

A large part of the funding was given to large projects. 26 percent of the projects were larger than 10 million kroner. These projects amount to 72 percent of total funding. 37 percent of the contracts were smaller than 3 million kroner, equalling 8 percent of total financing.

The main conclusion was that a relatively large part of the funding was given to the large companies, although there were large numbers of small companies taking part in research council programs.

5.2.4 Geographical distribution

Approximately half of the companies were situated in Eastern Norway, 25 percent in the western and central parts of the country (Vestlandet and Midt-Norge) and 1 percent in Northern Norway.

Northern Norway would get 7 percent if one added the NT-program (a program targeting technological development in this part of the country). Moreover, most of the funding for R&D on aquaculture and the fisheries was not included.

5.2.5 Type of institutions

Out of 317 projects from 1995 studied by the evaluation team, 99 involved co-operation between companies and research institutes. Out of these SINTEF was involved in 59 projects, NTNU in 5, Norsk byggforskningsinstitutt in 6.

Note that SINTEF was responsible for 53 percent of the turnover of 2566 mill kroner in the technical/industrial institute sector in 1995.

Chr. Michelsens Institutt, FFI and Institutt for energiteknikk seemed to play only insignificant roles as suppliers of user driven research to industry, in spite of being important research institutions.

5.2.6 Object achievement

The evaluators noted that the R&D activities had truly been user driven on the project level. On the other hand, the Research Council and the research institutes seemed to have played a more dominating role as regards the launching of new programs.

Hervik and Waagø drew the following main conclusions on the object achievements of user driven research:

1. **Expected return.** The 317 companies that were interviewed expected on average a 7 percent return on R&D-investments in the 1995 portfolio by 1998.
2. **Actual return.** If one compared the situation in 1996 with an earlier study of the user driven projects from 1985 to 1990, one could see that the firm's expectations were considerably lower than five years before. Nearly half of the projects classified as potentially very successful in 1992, was no longer considered so by the firms in 1996. The turnover had been reduced by half compared with the expected results. The evaluators did not expect that these projects would give a total return of 7 percent, as the large projects of 1992 had not succeeded in the market.
3. **Adjusted return.** If one compared the portfolio of 1985-90 with the one of 1990-1995 as regards the results *expected* by companies, one would find that 14 percent were considered very successful in the previous period, compared to 30 percent in 1995. 47 percent was considered unsuccessful in the previous, 30 percent in 1995. Because of this the evaluators expected that one did not have to adjust the expected results downward to the same extent as for

the preceding five years period. They concluded that the project should generate a turnover resulting in a 7 percent return.

4. **Additionality.** The Research Council had been directly responsible for the initiation of 30 percent of the projects, which means that some of the increase of turnover would have taken place anyway. Still, the Research Council has made the projects larger and contributed to a faster implementation. 37 percent of the projects report full additionality and it is highest for the small companies.
5. **The role of the Research Council.** 50 percent of the companies report that they have received advice and guidance only to a small degree. Less than 20 percent say that Research Council advice had been of importance. However, the Council did play a significant role as an adviser as regards financing and the coupling of companies and research institutions. As the main areas for improvement, the evaluators listed funding of preparatory projects *(forprosjekt)*, more substantial public financing, the selection of program areas, and a simplified management of applications.
6. **Risk profile.** 50 percent of the project portfolio report low *technological* risk, 40 percent a combination of low and medium range *commercial* risk. Only 10 percent expect a high technological and commercial risk. Approximately 30 percent reported development work only (not applied or basic research). According to Hervik and Waagø, this could indicate that some 30 percent of the projects did not agree with the research content and high-risk objectives.
7. **Investments in knowledge capital**. 66 percent of the projects report significant development of company R&D competences. Competences are primarily absorbed through the learning of product- and process development personnel and by use of advanced equipment.
8. **External effects**. The evaluators underline that competence development may have spin-off effects that cannot be easily calculated (mobility of personnel, networking etc).
9. **The effect on research institutes**. User driven research may have made the research institutes more market oriented. Moreover, the evaluators stress that the institutes get a competitive advantage from networking.
10. **R&D co-operation between companies.** Approximately half of the companies replied that inter-firm co-operation was an important part of the R&D project. 43 percent said that co-operation with other firms influenced the result in a significant way. There was a strong correlation between the importance of co-operation and the score for economic as well as general success.
11. **R&D services from the institute sector.** 55 percent of the participants buying R&D services from research institutions reported that there were elements of basic research in the project. 26 percent of the respondents reported that over 50 percent of costs were allotted to the commissioning of R&D services from R&D-institutions. As many as 45 percent said that this form of co-operation was an important part of the project, and 35 percent felt that this co-operation influenced the results greatly.

12. **Research content.** The research institutes considered that the research content of user driven projects was higher than in regular commissioned work. Only 5 percent of the 99 projects done by R&D institutes were considered technological development, the rest was classified as applied research (10 percent) or basic research (ca. 35 percent). These 99 projects led to 19 doctorates, 117 science articles, 250 lectures at international conferences and 9 registered patents. In 80 percent of the projects several institutes co-operated. In 30 percent there was established new contacts. On the other hand, there were few universities, colleges or foreign research institutions involved in this work.
13. **User governance.** User driven research was to a large extent governed by users on the project level, and as regards implementation also on the program level. On the other hand, the Research Council and the research institutes were most active in the initiation process. Hervik and Waagø felt that the main challenge for the Research Council would be to take the R&D needs of the users – including long term technology and market trends – into consideration when designing new programs.
14. **Social profitability.** The evaluators underlined the spin-off effects of this kind of research (cp. the market failure argument). The social returns may be higher than the returns for the individual company taking part in the project, due to the mobility of competences and personnel, networking and the use of the new technology and knowledge in other parts of society. Hervik and Waagø pointed out that it is very hard to calculate this kind of social effect. They said that the evaluation had indicated much network and competence building. Moreover, the 'external' R&D had significant components of traditional research (as opposed to technological development).

5.2.7 Research Council management

In the period of 1990 to 1995 the Research Council (RCN) had between 50 and 60 programs running simultaneously. The individual programs lasted between three and five years and the size varied from 10 to 1030 million kroner (on average NOK 120 mill.). All programs had their own program leader and a program board with representatives from users (companies) and research institutions.

The board of the Industry and Energy Division decided on the implementation of programs, and the program boards allocated funds to the individual projects.

Hervik and Waagø felt that the program organisation made it possible to discuss the management of user driven research in a meaningful way, as each and every one of them could be considered well defined, and time-limited objects.

In 1996 RCN decided to reduce the number of programs to 12 programs or program areas. These programs did also have their own boards and program leaders. It seemed, however, that this new form of programs had no definitive start or ending. The evaluation team recommended that the Research Council established sub programs with a clearly defined start and ending.

Program leaders responsible for programs with a low realization capacity *(gjennomføringsevne* – i.e. ability to carry out its tasks in a satisfactory manner),

reported that the following factors should have been mapped in a better way before the program was implemented:

- The specific needs for R&D of the users
- The users' competences and R&D experience
- The users' ability and willingness to invest in R&D

In general broad and unspecified branch-oriented programs had more users with low realization capacity. The best results were found in programs with high R&D content and clearly defined objectives and target groups.

The evaluators concluded that the objectives ought to vary according to the users realization capacity. If the competence base and R&D capacity of the firms are lacking, one should concentrate on improving their ability to take part in R&D, by developing the competences of personnel and helping them achieve technical and commercial success. In such programs, Hervik and Waagø argued, competence building will be as important as profitability, turnover and employment.

Between 1990 and 1993 the research council for natural science and technology, NTNF, had a separate office for program initiation, called the Research Department. The Research Department had a separate Program Section responsible for program planning and launching. The Contracts Section was responsible for the follow-up work.

After 1993 the work done by the Research Department of NTNF was transferred to the secretariat of the Industry and Energy Division of the new Research Council of Norway. From now on the program leader was also made responsible for program design and initiation, in addition to the day-to-day operative work. Hervik and Waagø felt that this combination could be very strenuous for the individual program leader.

The program leaders were asked about the most important sources of ideas in the planning phase of a program. Most ideas came from the research institutes and the Research Council itself.

Hervik and Waagø also studied the quality of the foundation for program decision-making. It seemed that the quality of the documentation used in preparing new programs were of a low quality, although the evaluators underlined the importance of informal contacts. The realization capacity of the participants – including research and financing ability – was often not documented or argued for in a satisfactory manner, nor was additionality, the size of the budget and various objectives.

The evaluators commented that it could be difficult to see whether there really were more potential qualified projects and programs than the ones carried out by the Research Council. By getting more project proposals the program leaders would become more independent vis-à-vis the more dominating program participants, Hervik and Waagø argued.

It seemed that the program leaders were chosen primarily on the basis of their ability to run programs, and not on their ability to define and develop them. Because of this

few programs changed. Most of the program leaders were engineers, often with some background from economy and administration. They normally had work experience from industry, consultancies or research. The program leaders considered contacts and some experience from the relevant branch of industry to be of great importance.

The program leaders forwarded his or her project proposal to the program board, which normally accepted this proposal without changing it (80 percent). The boards turned down only 5 percent of the proposals. This could indicate that the budget was large enough to cover all proposals, or that the proposal has been discussed informally with the board leader or other relevant persons.

The project proposals were seldom checked by external consultants or by 'peer review'. 30 percent of the projects were controlled afterwards, as they were presented on research conferences. 60 percent of the program leaders felt the need for a tailor-made quality- and result control system.

5.2.8 Possible improvements

The evaluation listed following areas for improvement:

- More companies – especially small companies – should use R&D as a tool
- Universities and colleges should get involved in user driven research
- There should be better coherence between the research programs of RCN and sectors controlled by ministries, in order to improve overall governance by management and objectives
- RCN should look at the procedures for initiation and administration of programs
- The programs should be evaluated on the basis of a more coherent system
- Programs ought to be classified according to the participants ability to perform R&D
- The preparations made before the program boards make their decisions should be of a better quality
- The system of hiring external program leaders functions well and should be continued
- The program leaders ask for more systematic arrangements for learning and quality-control
- The co-operation and co-ordination with SND can be improved
- There is need for ex ante evaluations of additionality
- The selection and follow-up of projects can be improved

5.3 Møreforskning's annual reviews of user driven projects

The Industry and Energy Division of the Research Council has asked Møreforskning to produce annual reviews of user driven research based on data from the RCN Provis database since 1997.

Møreforskning argues that the Provis database may give very good and extensive information on the user driven R&D projects in the Research Council, provided that all project leaders and RCN administrators enter data in a coherent way. Møreforskning underlines that Provis gives information on *expected* results. The actual results are not known.

Note that this presentation is based on a draft version of the 1999 report. Møreforskning may adjust some of this information at a later stage.

5.3.1 Report for the project portfolio of 1999

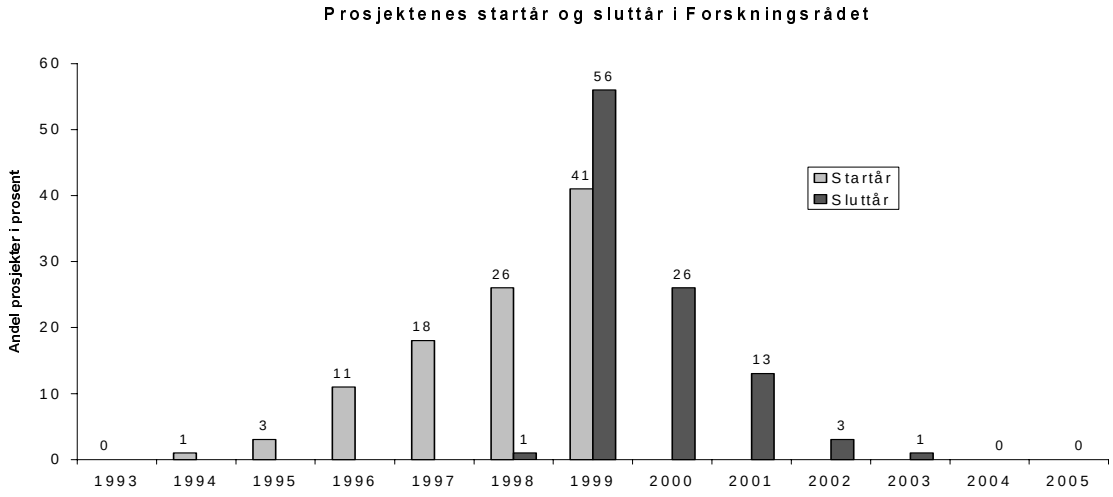


Figure 5.3.1: First and final year of RCN projects (taken from Bræin 2000). Startår=first year, Sluttår=final year, andel prosjekter i prosent=percentage of projects. Source: Møreforskning

In its report for 1999 (Bræin et. al. 2000-A), Møreforskning presents a project portfolio of approximately 900 projects. Total support (reimbursed or budgetary) equals NOK 2 billion. In 1999 the number of projects that ended exceeded the number of new projects, hence the total number was reduced with some 150 projects (NOK 420 million).

Nearly half of the projects were expected to last less than 3 years. These projects received 13 percent of the RCN financial support. 24 percent were classified as 3 year long, 29 percent with duration of more than 3 years. The last group received as much as 65 percent of the financial support.

70 percent of the projects were relatively small projects (meaning less than NOK 2 million in total support). One third of them were very small (< NOK 0.5 million). However, projects receiving more than NOK 2 million get as much as 80 percent of total funding.

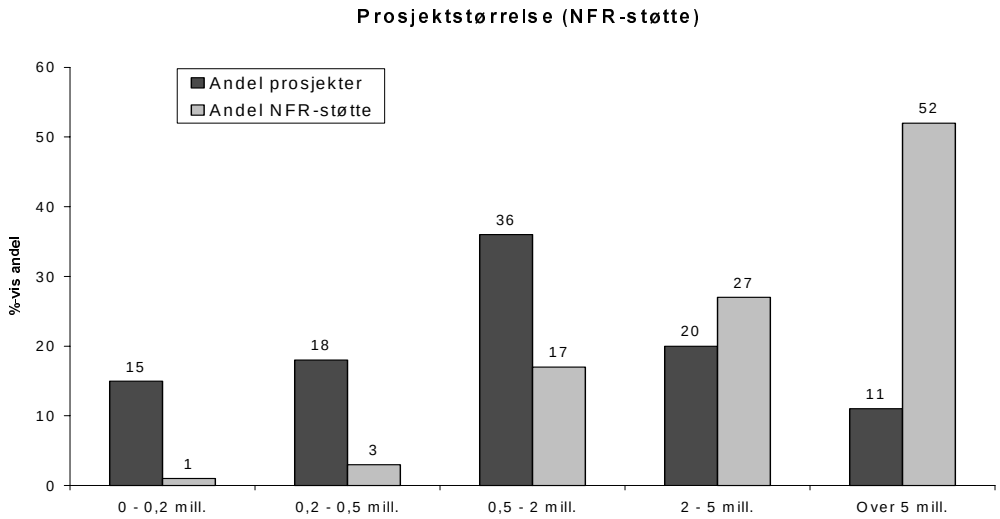


Figure 5.3.2: Size of projects (from Brœin 2000), Andel prosjekter=percentage for projects, Andel NFR-støtte=Percentage of total RCN funding. Million NOK. Source: Møreforskning

In 46 percent of the projects the contract partner were firms with strong R&D experience, and these projects receive 58 percent of total funding. As regards new projects, a larger proportion of the funding was channelled to companies, and less to R&D institutes and universities/colleges. In 1999 the funding of companies with strong R&D experience increased significantly in relative terms.

Table 5.3.1: Number of projects and percentage of funding 1999 (after Brœin 2000)

Applicant category	Projects ending 1999				Projects starting 1999			
	Projects		Funding		Projects		Funding	
	No.	%	No.	%	No.	%	No.	%
Companies with high R&D experience	218	43	379	47	162	45	202	54
Comapnies with small or no R&D experience	139	27	104	13	106	29	81	21
Branch organisations/groups of companies	46	9	88	11	33	9	56	15
R&D institutes, universiteis and colleges	104	21	232	29	59	16	38	10
Sum	507	100	803	100	360	100	377	100

Source: Møreforskning

The largest proportion of the portfolio contains research projects focusing on the development of new knowledge (42 percent of the projects and 59 percent of the funding). The relevant scores for development projects are 33 percent and 29 percent, for support projects 25 percent and 12 percent. In 1999 the share going to research projects was increasing.

Table 5.3.2: Project categories, number and funding 1999 (after Brœin 2000)

Project category	Projects ending 1999				Projects starting 1999			
	Projects		Funding		Projects		Funding	
	No.	%	Mill.NOK	%	No.	%	Mill.NOK	%
Research projects	168	32	304	38	114	32	198	52
Development projects	137	33	321	40	116	32	132	35
Support projects	178	35	172	22	130	36	48	13
Sum	503	100	797	100	360	100	378	100

Source: Møreforskning

Table 5.3.3: Projects sorted according to braches or sectors of industry

Branch of industry	RCN support NOK mill.	RCN support accumulated NOK mill.	Number of projects	Percentage of RCN support
Biotechnology (bioteknologi)	5	5	2	1
Construction (bygg/annleggssektor)	101	106	7	5
Maritime (maritim virksomhet)	125	231	10	6
Services (tjenestesektor)	155	386	12	8
Brach-independent (bransjeuavhengig)	271	657	8	14
Energy (energisektor)	367	1025	24	18
Technology/manufacturing (teknologi/vareproduserende)	487	1512	28	24
Process industry (prosessindustri)	487	1999	9	24

Source: Møreforskning

Aspect evaluations

Table 5.3.4: Total project portfolio and sample sorted according to length of project, number and percentage Provis 1999 (after Brœin 2000)

Project duration	Total portfolio		Sample		Excluded from sample %
	No.	%	No.	%	
< 3 years	428	47	247	36	42
3 years	219	24	203	30	7
> 3 years	257	29	235	34	9
TOTAL	904	100	685	100	24

Source: Møreforskning

Møreforskning has done an analysis of the project leaders' assessment of project applications. The sample contains 76 percent of the projects (685 out of 904) and 84 percent of the funding. Very small projects – normally pilot studies, infrastructure, non-R&D reports, information projects etc. – have been removed. So has doctorates, basic funding, support for equipment, and scholarships.

Table 5.3.5: Total project portfolio and sample sorted according to RCN funding Provis 1999 (after Brœin 2000)

Projects size (measured by RCN funding)	Total portfolio		Sample		Excluded from sample %
	No.	%	No.	%	
0 – 0.2 mill.	137	15	0	0	100
0.2 – 0.5 mill.	157	18	156	23	0
0.5 - 2 mill.	318	36	286	42	10
2 - 5 mill.	176	20	161	23	9
Over 5 mill.	102	11	82	12	20
TOTAL	890	100	685	100	23

Source: Møreforskning

There is an even distribution of projects as regards the size of the funding. As many as 36 percent of the projects are in the NOK 0.5 to 2 million range, though.

Table 5.3.6: Total project portfolio and sample sorted sector or branch of industry Provis 1999 (after Brœin 2000)

Branch or sector of industry	Total portfolio		Sample		Excluded form sample %
	No.	%	No.	%	
Energy sector	215	24	172	25	20
Tech./manufacturing	250	28	182	27	27
Maritime	94	10	83	12	12
Process industry	85	9	72	11	19
Construction	60	7	45	7	25
Biotechnology	14	2	8	1	43
Services	108	12	63	9	41
Branch indipendent	78	9	60	9	23
SUM	904	101	685	101	24

Source: Møreforskning

The dominating industries as regards number of projects are technology/manufacturing and the energy sector. Biotechnology is by far the smallest branch of industry in this context.

Table 5.3.7: Total project portfolio and sample sorted according to contract partner, Provis 1999 (after Brœin 2000)

Contract partner	Total portfolio		Sample		Excluded form sample
	No.	%	No.	%	%
Companies with high R&D competence	412	46	338	50	18
Companies with small or no R&D competence	218	24	153	22	30
Industrial organisations/company groups	90	10	76	11	16
R&D institutes, universities and colleges	183	20	117	17	36
SUM	903	100	684	100	24

Source: Møreforskning

As many as 46 percent of the contract partners are companies with a high level of R&D competence. R&D institutions also must be considered R&D intensive (20 percent). Only 24 percent of the portfolio can be considered companies with small or no R&D competence.

The following is a summary of the main findings:

Aspect 11: total assessment of the relevance and quality *(støtteverdighet)* of projects.

- Additionality and relevance is considered of great importance. Other major aspects, like research content, do not influence the total assessment in any significant way.
- Companies with strong R&D experience are given the highest marks in the total assessment, but there are only small differences.
- Research-projects are in general considered to be more worthy of support than project designated as development or support projects, but the differences are small.
- Large projects are considered more worthy of support than small projects.

Project size in NOK million	Aspect scores, percentage of projects		
	Score 1-3	Score 4-5	Score 6-7
0.2-0.5	6	76	18
0.5-2	2	69	29
2-5	1	61	38
> 5	0	48	52

- Construction work projects *(bygg/anlegg)* have the lowest score of the industrial branches, while biotechnology, technology/manufacturing, process industry and branch-independent companies get the highest score.

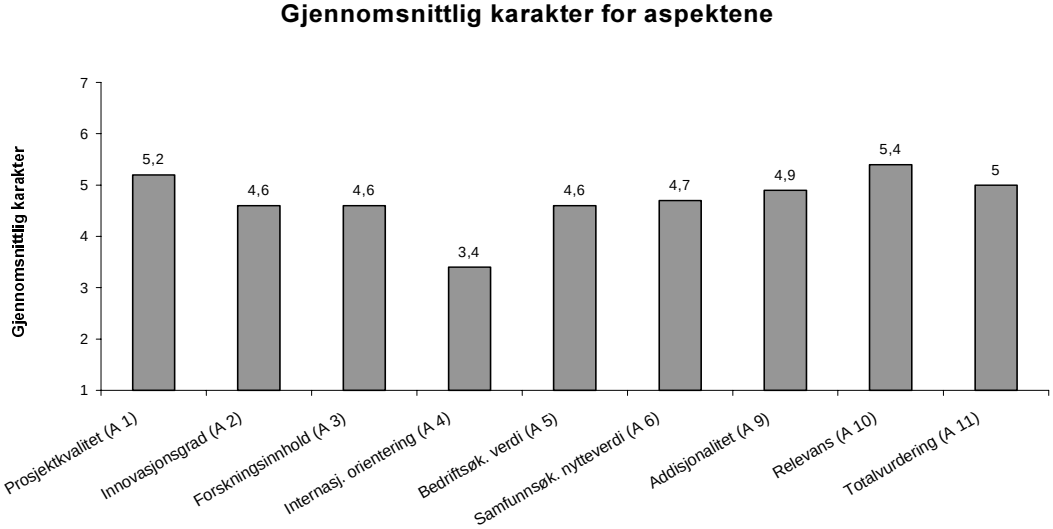


Figure 5.3.3. Average aspect scores (from Brœin 2000) A1=project quality, A2=degree of innovation, A3= research content, A4=international orientation, A5=economical value for the company, A6=socio-economic value, A9=additionality, A10=relevance, A11=total assessment. Source: Møreforskning.

Aspect 1: General project quality

This aspect express to what extent the project fulfils demands that is relevant to any project, regardless of content and type.

The average score is 5.2 on a scale from 1 to 7, 7 being the best.

A score of 6 indicates a well documented and presented project based on a good project idea. Nearly all quality criteria are considered ‘good’, and no criteria are considered ‘weak’. A score of 4 signifies a project of a good quality with satisfactory documentation. The project contains no quality weaknesses that indicate that the project should not be implemented.

- The score for project quality is in general higher than for the other aspects.
- Companies with strong R&D experience get the highest score, food branch organisations get the lowest.
- Research projects get the highest score, support activities the lowest.
- The larger the project is, the higher the score. The average score for small projects is 4.8, for large projects 5.8.
- Projects of long duration get higher scores.
- Projects from the process industry get the highest score, construction the lowest.

Aspect 2: Degree of innovation
Degree of innovation indicates innovative capability compared with the ‘state of the art’ in a specific area. R&D content is not considered.

The average score is 4.6 on a scale from 1 to 7. 7 signify a fundamental/radical innovation on a global scale and a significant step forward compared with ‘state of the art’. 5 indicates a fundamental/radical innovation on a national or branch level, 3 a fundamental/radical innovation on a company level, and 2 a minor innovation on a company level.

- The degree of innovation (innovation intensity) is considered to be higher in projects where companies are the contract partners, as opposed to branch organisations, institutes, universities and colleges
- The innovation score is the same for companies with weak or strong R&D experience. The degree of innovation is considered to be much smaller in support projects.
- Larger projects are given a much higher innovation score than smaller.
- The research projects are given a higher score than support projects.
- The degree of innovation for long and short projects is considered to be the same.
- There is no significant difference between branches of industry.

Aspect 3: Research content
This aspect gives an indication on to what degree the project brings forth new knowledge of importance for the scientific and technological development of the relevant scientific or scholarly discipline.

The average score is 4.6 on a scale from 1 to 7. 7 signify work in the front of international research, and publication in international science publications with referees is expected. Projects scoring 4 are expected to deliver research of a generally good quality, although publication in international science periodicals is not expected. 2 indicate development work giving only small amounts of new knowledge.

- Companies with strong R&D competences get the highest score (5.0), R&D institutes and universities/colleges get a lower average score (4.5).
- There is a strong correlation between project size and research content. The larger the project, the higher the research content is considered to be.
- Longer projects are considered to be more R&D intensive than short ones.
- There are significant differences between the branches of industry. The category 'branch-independent' has the lowest R&D content, the process industry the highest.

Aspect 4: International orientation

This aspect is to give an impression of to what extent the project is strengthening the international position of Norwegian companies and R&D institutions through international co-operation.

The average score is 3.4 on a scale from 1 to 7. 7 indicates close co-operation between Norwegian and foreign parties. The standing of the Norwegian participants will clearly be strengthened, also as regards international market positions. A score of 3 signifies that there is some international industrial or scientific/technological co-operation, but this is not important and the international role of the Norwegian participants will not be strengthened.

- The internationalisation score is highest for projects with R&D institutes and universities/colleges as contract partners, and lowest for projects governed by branch organisations (industrial organisations).
- There are no significant variations as regards type of project (research/development/support).
- Large and long-lasting projects are in general considered to be more international than small and brief ones.
- The maritime sector gets the highest 'internationalisation score', biotechnology the lowest.

Aspect 5: Company economy

- Project leaders expect more economic profitability from projects led by companies with no or little R&D experience, than from projects led by R&D institutes and universities/colleges.
- Development projects are predicted to be most profitable.
- Large projects score higher than small projects.
- The duration of the projects is not necessarily considered to be of importance.
- There are large differences between branches of industry as regards predicted economic outcome. Biotechnology gets the highest score, energy, construction and branch-independent projects the lowest.

Aspect 6: Socio-economic value

- Projects having companies with no or little R&D experience are considered to generate the smallest socio-economic effects (i.e. social wealth creation caused by spin-off effects).

- There are no significant variations between the project types (research/development/support).
- Large projects are considered to be marginally more effective than small projects.
- Long-term projects score more than short-term projects.
- Of the branches of industry branch-independent projects score the most, the maritime sector the least.

Aspect 7: Risk

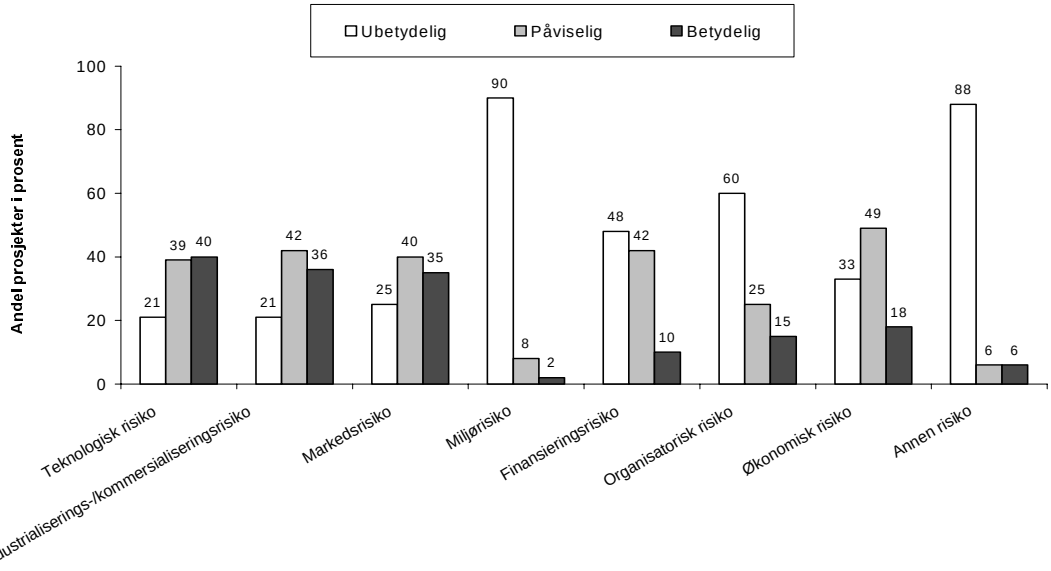


Figure 5.3.4: Elements considered when assessing project risk (from left to right): technological risk, industrialisation/commercialisation risk, market risk, environmental risk, financial risk, organisational risk, economic risk, other. White column: insignificant risk, grey column: measurable risk, dark column: significant risk (Bræin 2000). Source: Møreforskning.

- 33 percent of the projects are expected to have no significant risk elements.
- Risky projects are considered to be potentially more profitable for the companies.
- Large projects are considered to be more risky than small projects.

Aspect 9: Additionality

- There seems to be no correspondence between type of contract partner and additionality or between type of project (research/development/support) and additionality.
- Big and long projects are considered to give a slightly stronger additionality than small and brief projects.
- The project leaders expect little additionality from construction projects, but significant additionality from biotechnology projects.

Aspect 10: Relevance

- This is considered to be an important aspect (giving a higher average score than other aspects).

- There are no significant differences as regards types of projects, categories, contract partners or duration.
- The largest projects – i.e. projects with the largest RCN support – are considered to be more relevant for the program objective than small projects.
- Construction gets the lowest score of the branches of industry, the process industry the highest.

5.4 Trend analysis of new company projects 1995 – 1999

Møreforskning has also produced a preliminary version of a report on trend analysis of newly started company projects 1995 – 1999 (Bræin et.al. 2000-B). This analysis is based on annual (phone) interviews made no later than 1 year after the start of the projects.

Note that The Industry Energy Division of the Research Council annually support some 300 to 400 *new* projects. Size, duration, recipients and objectives will vary, and in order to establish comparable selections, Møreforskning has selected projects that share some similarities. This extract of the total portfolio may therefore in some instances not be representative for all new projects financed as user driven projects under RCN.

Møreforskning has only selected R&D projects for this survey.

Note: This summary is taken from a preliminary version, and may be subject to changes!

The number of respondents represents 70 percent of the total selection.

Here are the main results:

The portfolio

- There are large variations in the number of new projects that are admitted into the portfolio each year.
- The proportion of projects with companies as contract partner is increasing, while the number of projects governed by R&D institutes, branch organisations and others is declining. The proportion of projects led by universities and colleges is stable.
- The number of new company led projects larger than NOK 200,000 in total support and lasting more than 2 years is decreasing.
- A large proportion of company projects is carried out by R&D-institutions commissioned by the companies.

Expectations regarding company development

- The expectations regarding the importance of this project for the development of the company become smaller over time.

Excepted economic effects

- Expectations regarding the projects' influence on the companies' economic results are declining in the period 1997-99.
- From 1996 to 1999 a larger proportion of firms have – or are able to – calculate economic returns (69 percent in 1999). In 1995 as many as 97 percent were able to perform such calculations.
- Half the companies in the 1999 portfolio expect economic results after two years. The similar proportion in the 1995-portfolio was 69 percent.
- During the period 1996 to 1999 the proportion of 'low risk' projects (less than 20 percent probability for *not* achieving economic results) was increasing. However, from 1997 to 1999 the proportion of high-risk projects (>50 percent) is also increasing. The 1995-portfolio presented a much lower risk for economic failure than the following years.
- The projects' influence on company survival and profitability is moderate, and much lower than for SND-projects, even 3 to 4 years after closure. This highlights the fact that many of the Research Council projects operate under a long-term perspective.
- Since 1995 the Research Council seems to have changed its strategy towards user driven projects with company contract partners. There is a shift from a strong demand for economic returns and limited risk to more long-term projects with less emphasis on economic returns.

Expectations as regards technological results and competence building

- The expectations of the companies as regards technological results are relatively high and stable. Approximately 40 percent of the companies in the period 1997 to 1999 report high expectations.
- Approximately 50 percent of the companies in the 1998 and 1999-portfolios feel that there is low risk (less than 20 percent) for failing technologically. There are no clear trends over time.
- In the period 1997 to 1999 more and more companies expect competence development as a result of project participation. In 1999 as many as 62 percent report such expectations.

Additionality and the role of the Research Council

- In the period 1997 to 1999 40 percent of the companies hold that the project would have been shelved without RCN support (high additionality). This is approximately 10 percentage points higher than for the 1995 to 1996 period. The proportion of projects with low additionality has always been small (1-2 percent). RCN projects report in general higher additionality than SND-projects.
- 70 percent feels that RCN-support has been of great importance for the realisation of the project, while 5 percent feel it has been of small importance. The proportion of firms reporting great importance is falling.
- The role of RCN seems to be of great importance as regards company-R&D institute co-operation (38 percent report 'of great importance' in 1999), although the effect is becoming less pronounced.
- The role of RCN as regards business-to-business co-operation is not that strong (less than 30 percent reports that RCN is of great importance). Still, there is a tendency towards more B2B co-operation.

- One third of the companies feel that project co-operation and networking is of great importance for company development. This proportion is stable over time.
- Only 15 percent report that RCN contribute to a dissemination of R&D results, while many answer 'don't know/not relevant'. Møreforskning adds that most companies will tend to keep significant R&D results for themselves as long as possible in order to benefit from competitive advantages. One can therefore hardly expect that the companies will like the RCN to contribute to a dissemination of results.
- RCN support does to a large degree contribute to an increase in the R&D efforts of the companies. 40 percent of companies report this. In 1999 a large proportion of firms felt that the support did not (or only to a small degree) displace other projects in the company.
- One third of the companies report that RCN support leads to more long-term projects. During the last three years the effect seems to have been increasing.
- As many as 40% of the companies feel that public support leads to larger and more 'exciting' projects.

5.5 Customer satisfaction in user oriented programs

Patrick Verde and Erik Juel of AIM AS have done a survey of consumer satisfaction on behalf of the RCN Industry and Energy Division (IE). They have contacted firms taking part in the Industry and Energy Division's user driven programs (Verde 2000).

The objective of the survey was to develop tools that could be used to evaluate the way in which IE treats its 'customers' and to improve various aspects of this behaviour.

As Verde and Juel are interested in 'consumer satisfaction', they are implicitly focusing on RCN as a service organisation. The question is whether RCN is able to provide services that contribute to the organisation reaching its main objectives. By 'customers' are meant companies and institutions taking part in IE funded projects.

This consumer oriented way of thinking fits well with modern innovation theory's systemic approach. In the same way the success of a company rests on its ability to interact with other companies and organisations in order to find knowledge, customers and partners, the success of the IE instrument is depending on the companies' ability to find relevant projects, build appropriate networks and make proper use of the RCN funding. Obviously RCN must see to it that its resources – funding and competences – are utilized in an efficient way.

AIM asked companies (i.e. projects leaders and administrators) about their interaction with RCN. These are projects that started and/or finished in 1999. Only projects where the contract partner is a firm have been considered.

10 programs are included: OFFSHORE, BAE (Bygg, anlegg og eiendom), EFFEKT, PROSMAT, NYTEK, MARITIM, PROGIT, NIN, VARP, TYIN.

The survey was divided into five parts:

- The main survey, targeting IE's main customer group, i.e. companies that have received support from IE on the basis of applications accepted by program boards
- A survey of TEFT-customers
- A survey of other participants in networks where the contract partner is a company
- A survey of other participants in networks where the contract partner is an R&D institution.
- A survey of 'non-customers', i.e. companies that do have R&D activities, but have not been IE customers.

5.5.1 Main Findings

1: Limited renewal
Most of the respondents in the main survey belong to a relatively homogenous group. This homogeneity is strengthened by the fact that they have had a relationship with the Research Council for some time. According to AIM this is a problem, as the objective of the programs is innovation, including the recruitment of new 'customers'.

Table 5.5.1: AIM study, old vs. new customers

		Administrative project co-ordinator		Project leaders		Total	
	Alternative answers	No. of replies	%	No. of replies	%	No. of replies	%
Have you participated in a RCN supported project before taking part in this project?	Yes	99	84 %	89	72 %	188	78 %
	No	19	16 %	34	28 %	53	22 %

Source: AIM

2: Weak transparency
The customer relations of IE are unusual: The more experienced and R&D competent the customers are, the more satisfied they appear. AIM would expect the opposite: Experienced customers are normally more critical.

One of the few exceptions is in the field of 'application criteria', where the experienced customers are less satisfied than the others.

'Non-customers' (i.e. NHO companies that perform R&D activities that are not co-financed by RCN) and network-participants (in projects where the contract partner is an R&D institute) are most disapproving of the IE services. However, these are actors that primarily judge RCN on the basis of a general impression, not on their own experience.

AIM's interpretation is that in order to be satisfied with the participation in IE user driven programs, the customer must adapt and become a part of this culture. This lack of transparency may be one of the reasons for the weak customer base renewal.

Table 5.5.2: AIM customer study. User satisfaction, RCN IE user driven programs

100% equals top score (the most positive evaluation) on a scale from 1 to 7.	Administrative project co-ordinator		Project leader		total	
	No.	%	No	%	No	%
How important is this project for your/your contract partner's activity?	116	67	116	68	232	67
How content are you with the general information given about the RCN measures?	117	57	119	59	236	58
...about RCN programs?	116	56	119	57	235	57
...about funding criteria?	114	56	122	57	236	57
All in all, how satisfied are you with the informational efforts of the RCN?	118	60	122	58	240	59
All in all, how easy did you find it to track/find the relevant program?	107	72	106	72	213	72
To what extent are you satisfied with the RCN application criteria?	115	58	116	59	231	59
... their demand for documentation?	113	64	120	67	233	66
… their demand for economic reports?	118	70	119	71	237	71
… their demand for progress reports (as regards R&D and technological development)?	116	67	121	68	237	68
All in all, how satisfied are you with RCN's ability to understand the situation the company is in?	118	64	121	66	239	65
All in all, how satisfied are you with the advantages you got from the discussions with the RCN on the challenges given by your project?	109	59	107	61	216	60
How satisfied are you with the composition of the participants in the (project) network?	65	69	68	70	133	70
...with the contributions of the research institutions?	66	65	70	60	136	62
...with the contributions form the other companies?	55	65	61	60	116	62
…with the contribution of your own enterprise?	65	71	69	72	134	71
All in all, how content are you with the network?	64	69	68	66	132	67
How content are you with the contacts that are created with participants with R&D competences?	64	69	73	66	137	68
…with participants that are primarily interested in commercialisation?	57	58	67	61	124	60
How content are you with the financial contribution from the RCN?	117	56	123	60	240	58
...with the adapt ion of payments to the progression of the project	115	71	121	70	236	70
All in all, how content are you with RCN's follow up after the project was finalized?	46	45	54	49	100	47
All in all, how content are you with the RCN?	118	61	122	63	240	62

If you were to impose ideal demands, how satisfied are you with the RCN?	113	50	120	52	233	51
All in all, to what degree has the co-operation with the RCN influenced the project?	116	64	122	67	238	65
If your company will need to go through with an R&D project again, how likely is it that you will recommend that this is done i co-operation with the RCN?	117	85	123	84	240	84
If you were asked for advice by others in the same situation as your or your contract partner, how likely is it that you will recommend others to ask the RCN for support?	117	86	123	86	240	86
If we imagine that the RCN gave no financial support, and provided advice and support for networking only, how likely is it that you would get in touch with the Council?	118	25	122	28	240	27

Source:AIM

3: Strong person dependency

Customers report strong dissatisfaction with the IE services when the relevant co-ordinator is absent. This person dependency is also visible in variations between programs.

AIM argues that IE has weak routines and systems for the treatment of customers, which is reflected in the lack of transparency. Hence there is a need for an improvement of customer treatment.

Table 5.5.3: AIM customer survey. Attitude towards contact persons.

100% equals top score (the most positive evaluation) on a scale from 1 to 7.	Administrative project co-ordinator		Project leader		Total	
	No.	%	No	%	No	%
How content are you with the RCN as regards the contact persons ability to give clear and unambiguous answers	102	73	116	76	218	74
…the availability of your contact person?	100	76	115	75	215	76
…the possibility of getting help if your contact is unavailable?	66	52	81	57	147	55
…the follow up of unsolved problems/questions?	71	62	77	63	148	62
…response time?	97	64	105	67	202	66
How content are you with RCN's ability to point you to the right person?	81	67	96	70	177	68

Source: AIM

4. Financing, the most important factor for loyalty

While the customer satisfaction is low, loyalty is very high (i.e. it is very likely that the customers will recommend participation to others): 80 percent report that the (financial) support of IE has contributed in a significant way to the project (high additionality).

AIM concludes that it is the financial contribution in itself that influences additionality and loyalty, not how the customers feel about the service level. However, the size of the funding is not important.

5. Networking is the most important service

Most of the customers have discussed organisational and technological issues with IE, but they are not satisfied with this advisory function. The variation in this form of approval does not coincide with their overall evaluation. AIM concludes that the advisory function is not an important part of the IE customer relationship. Hence IE has failed in developing advisory services that are of importance in these relationships.

AIM adds that if advice is to influence the IE/customer relationship, it will have to be 'extraordinary', for instance by developing a network with foreign companies. AIM feels that IE should limit it systematic advisory efforts to areas where it actually may do something 'extraordinary', including networking. The customers will fetch other types of advice from other sources.

Only 40 percent say that they have received help in network building, and they are not satisfied with the effort.

Table 5.5.4: AIM customer survey: R&D networking.

100% equals top score (the most positive evaluation) on a scale from 1 to 7.	Administrative project co-ordinator		Project leader		total	
	No.	%	No	%	No	%
How satisfied are you with RCN's assistance in establishing and developing co-operation with Norwegian R&D institutions.	32	48	45	50	77	49
...with Norwegian industry?	33	45	46	51	80	49
...with foreign R&D institutions?	29	30	37	40	66	36
...med foreign industry?	28	27	35	26	63	26
All in all, how satisfied are you with RCN's help in establishing and developing R&D co-operation?	59	49	66	51	125	50

Source: AIM

Conclusion

AIM concludes that IE should focus on improving the transparency of the services provided. The criteria for support should be made more clear, the information processes should be improved and followed up. At the same time IE's ability to provide project services should to a smaller degree rest on one man or woman only.

Table 5.5.5: AIM customer survey. Survey of 'Non-customer', i.e. NHO companies that perform R&D activities that are not co-financed by RCN

		Alternative answers	No.	%
Are you responsible for your company's R&D activities?		Yes	46	84 %
		No	9	16 %

Have you been responsible for – or led – a project supported by the RCN?	Yes	2	4 %
	No	53	96 %

Financing			
Respondents that find RCN support to be of little use (graded 1, 2 or 3 on a scale from 1 to 7) are asked why this is so	Do not need support from the RCN.	4	29 %
	RCN support is too small	5	36 %
	Other	6	43 %

'Loyalty'			
If your company should enter a situation where applying for R&D funding was an option, would you recommend an application to the RCN?	Yes	50	91 %
	No	5	9 %

Knowledge of the RCN			
From where do you get your knowledge of the RCN?	I have been in contact with the RCN.	36	65 %
	RCN Web-pages	16	29 %
	Brochures	37	67 %
	The magazine Forskning	23	42 %
	Others who have been in touch with the RCN	41	75 %
	Industrial branch organisations	27	49 %
	Other public instruments (incl. SND, Eksportrådet	28	51 %
	Other(excl. media)	29	53 %

Source: AIM

See also a separate appendix containing more data from the AIM customer survey.

Chapter 6. Appendixes

6.1 The STEP sample and the database from RCN

Firms

From the databases of the Research Council we chose to get an overview of all the User oriented projects with their first year of RCN financing in the period between 1998 and the end of 2000. We did not want to go any further back in time than 1998 because we were afraid that the respondents would have trouble remembering details from a R&D project started, and perhaps finished, such a long time afterwards.

The reason why we wanted to look at projects as far back as 1998 was that we hoped to detect some results from the projects, but this brings up the question of when to expect results from R&D projects. In the sample there are also projects started in

2000, and this might influence the chances of seeing any effects of the most recent RNC research projects.

The resources allocated to the user survey project decided the number of distributed questionnaires. With this frame as a point of departure, defined as about 700 firms and 100 institutes as a minimum, we had to choose respondents.

The data we got from the Research Council had some sort of structure, in that they were centred around what RCN calls 'responsible contract partner' (from now called contract partner – *kontraktspartner*), which is the entity that has signed the formal contract with the Research Council of Norway regarding the user oriented grant. This entity is in most cases a firm, but it can also be an institute, municipality, county, directorate, branch organisation, hospital and others. Since this is no distinct variable in the RCN data set, we decided to categorise the contract partners either as firms, institutes (university and college units included) or 'other'.

To each contract partner project there was a project leader recorded in the data set, i.e. a person formally responsible for the project. There were variations as to whether this person was connected to the contract partner or not. In addition to the contract partners of the projects, the data set included what RCN calls 'co-operating partners' *(samarbeidspartner)* of each project. These are entities (firms, institutes etc.) that in some way have been connected to the user driven projects.

In the data set from the Research Council one of the variables showed what user oriented programs the projects belonged to. As a result of discussions with IE and BF some programs in the data set were removed. IE often define programs as user driven when they receive funding from The Ministry of Trade and Industry *(Nærings- og handelsdepartementet)*. However, these are not all user driven in the way that users administer industry-oriented R&D. Some of the projects belonging to this category are projects where the main objectives are networking, general competence building and the improvement of the absorptive capacities of firms. IE programs being removed from the sample for this reason are BRO (incl. TEKNOVE), FORNYII, P-2005, HMS and FAKTA. Additionally, DEMO2000 and HOYKOM have been removed as these are external tasks imposed the RCN, and not part of the RNC budget. Of the BF programs the SKOGFOND and TTVF programs have been removed, since these are external funds where RCN simply run the secretariat or manage the fund for The Ministry of Agriculture.

The data containing the contract partners, the project leaders and the co-operating partners in each project then had to be joined with separate address files from the RCN. Since the Research Council does not operate with unique organisation numbers (official number of every economic entity in Norway) regarding its contract partners or co-operating partners, the joining of these separate address files to the project files is a 'dangerous' task.

The joining was executed by using the name of the entity, with all the source of errors this might bring forth in terms of writing errors and lack of information. The data files and the address files were joined, and the number of records with addresses totalled 3646, distributed on 1248 contract partners with project leaders and 2398 co-operating partners. Since we in this first operation wanted to get a sample of firms,

the entities classified as institutes and 'others' were removed. Of 1248 contract partners 904 entities were firms. Correspondingly, 1214 of 2398 co-operating partners were firms.

From the data set it is evident that the contract partners are the most important to the Research Council since there is more background information attached to these partners (project leader/contact person and e-mail address in addition to regular addresses). For the co-operating partners there are, however, regular addresses only.

Despite the lack of information about the co-operating partners we still wanted to include these as part of our sample. The task of the user surveys was to investigate effects of the RCN funding, and as part of this, we wanted to include the possible effects in the co-operating partners. To avoid a too small sample in either group we therefore chose to use a reasonable even distribution of the contract partner and co-operating partner groups of firms.

We consider the best source of information for User oriented projects to be the project leaders of the projects. Using this person as an informant, we would get an overall picture of the project regarding the contact with the Research Council and the effects of the project. In the cases where the project leader was employed in the contract partner firm, we would get information regarding both the contract partner firm and the project as a whole.

Among the 904 contract partner firms, 361 projects had unique project leaders employed in the contract partner firm, and these became our sample of contract partner projects. By using unique project leaders we chose to get the broadest possible approach to the User oriented funding of RCN.

The approach chosen makes the sample skewed in the way that firms that figure numerous times in the 904 contract partner firm sample do not necessarily have unique project leaders. Firms that have used the same project leaders for many projects in the sample period are therefore underrepresented in our sample. In the cases where one project leader had more than one project we chose to use the project with the highest funding sum, thereby getting the sample of 361 contract partner firms.

In the case of co-operating firms, there were almost no project leaders to approach. For a group of 35 co-operating firms we were able to match project leaders to the co-operating firms. For the rest of the group of co-operating firms we chose simply to draw a random sample to match the number of questionnaires of the contract partner firm group. The final sample of the group of co-operating firms was 390 co-operating firms.

Institutes

In relation to the institute survey the point of departure was the same as for the firm surveys. The same programs as in the firm sample were removed from the institute sample. Out of 1248 contract partners there were 265 entities categorised as institutes. The term 'institute' was here used in a wide sense, at many different levels (ranging from research institutes and university institutes to subdivisions, subgroups, faculties or sections of the research/university institutes).

Using the same approach as in the case of contract partner firms, we chose to use unique project leaders of the projects. In the case of one project leader being in charge of more than one project, we similarly used the largest project as with the contract partner firms. The final sample for the institute survey was 172.

Scaling/Dropout and response rates

At first we sent out a questionnaire to the contract partner firms and a similar, but a bit less extensive, questionnaire to the co-operating partner firms, and asked the respondents to return the questionnaire within two weeks.

For the co-operating firms we had no information other than the name and address of the firm, and chose to send the questionnaire to the managing director of the firm. After the expiration of the deadline, we sent out a reminder by e-mail to the project leaders of the contract partner firms and a postal reminder to the co-operating firms, with a new deadline within one week. This process was repeated one more time.

The institutes got a different questionnaire with another set of questions than the firms. The questionnaires were sent to the project leaders as in the case of contract partner firms, and the same reminding procedures were followed.

From the different samples there were a number of dropouts. The largest group of dropouts was the group where the questionnaires were returned to us directly with 'address unknown' or 'firm no longer exist'. The group of 'firm no longer exist' most likely contain firms that are bankrupt or have been merged (which makes the firm hard to retrieve).

Another group of dropouts was where the project leader had left the firm or institute, and no other person in the firm or institute was able to answer. Another group of recipients have contacted us to let us know that the survey is not relevant for them for various reasons. Some firms hold that they do not remember the project or that they have not participated in this project. One possible reason for this feedback might be that the firms have or have had many projects with funding from the Research Council that makes it hard to single out one particular project. Another reason might be that the firm has not been directly connected to the project.

By the very fact that we in the case of co-operating partners do not have a specific contact person in the firm, it has been quite difficult to help the ones that have contacted us with more information about the project in their firms. Particularly in the co-operating firm survey there has been a problem that firms are not aware that they have been co-operating partners in a RCN funded User oriented project. This probably shows that the 'co-operating firms' that are reported to the Research Council have a varying degree of connection to the projects, both in terms of financial support and active participation.

The final response rates for the three surveys are presented in the table below.

Tabel 6.1.1: Response rates for the three different surveys

	A) Contract partners/project leaders - firms		B) Cooperating partners - firms		C) Contract partners/project leaders - institutes	
	Number	Percent	Number	Percent	Number	Percent
Not relevant	50	13,9	74	19,0	41	23,8
Answers	172	47,6	80	20,5	84	48,8
Total	220	60,9	154	39,5	125	72,7
No answer	141	39,1	236	60,5	47	27,3
Sum	361	100%	390	100%	172	100%

6.2 RCN user oriented programs

6.2.1 Energy and process industry (IE)

EFFEKT – power exchange and net monopolies
Program period: 1996-2001

The program is to contribute to user oriented R&D within the energy supply sector. EFFEKT primarily covers electricity but also other forms of energy where these are relevant in interaction with electricity supply. Within the framework of sustainable development the program is to contribute to increased returns in Norwegian industry and commerce. It has three main areas of concentration: power exchange, effective net monopolies as well as external environment and safety. The main target group for the program is the Norwegian power industry, power supply and public administration.

NYTEK
Program period: 1995-2001

Directed towards R&D of effective and renewable energy technologies the NYTEK program comprise the traditional renewable sources of sun, bio, wind, geotermic and wave energy, as well as ocean currents and salt gradients and small scale water power. The program is connected to the utilisation and transformation of these renewable energy technologies and is to focus on areas of commercial product possibilities for Norwegian firms. 70 percent of the funding is set for development of competitive products and 30 percent is set for more basic R&D to new Norwegian industrial and commercial development.

NATURGASS
Program period: 1996-2001

The superior goal of the NATURGASS (natural gas) program is the development of profitable goods and services based on the utilisation of natural gas. It is also to contribute to the development of new and existing gas related processes and new usages of natural gas in processing contexts.

The main target group of the program is therefore split: In the case of the development of profitable goods and services based on the utilisation of natural gas the program is directed towards equipment vendors, but also towards firms which in

different ways contribute to increased use of nature gas in Norway. In connection with the development of gas related processes the large, Norwegian petrochemical companies are the primary main target group. The program funding is supposed to trigger R&D activity and help reducing risk (*risikoavlastende*).

OFFSHORE (2010) – New well stream technology and SMF-innovation
Program period: 1999-2010

The main goal for the OFFSHORE program is to promote the development of new technology and competence/skills building within down hole and under water processing in small and medium sized firms (SMF). The program is to contribute to an international leading position for Norway in selected priority areas.

PROSMAT (2000) – Development and use of new knowledge for a sustainable
development of the Norwegian process and material industry
Program period: 1996-2001

PROSMAT is to contribute to the development of a Norwegian process industry, an industry preparing and refining an increasing share of the raw materials in Norway. Traditional raw materials are no longer bulk commodities but to a much larger extent tailor made products with special qualities customised to the needs of the customers. Competence is the most important tool for the industry, and the largest possibility to improve the competitiveness and profitability of the industry is to integrate new knowledge into the products. The PROSMAT projects are to be carried out in a close cooperation between firms and Norwegian universities, colleges and research institutes. The main target groups of the program includes industry within the sub business sectors of wood processing, light metals, ferro-alloys, petrochemicals, pharmaceuticals, fine and special chemicals, cerams *(keramer)*, as well as other chemical and metallurgical process industry.

MEDKAP (KAPBIO) – Næringsutvikling fra medisinsk forskning
Program period: 2000-2005

The goal of MEDKAP is to encourage value creation through increased exploitation of research results from medical research, a joint emphasis of IE and MH, which is a continuation of the IE program KAPBIO (Capitalisation of bio technology) and MH's focus on 'Business directed idea development from medical research'. The target group is mainly individual researchers or small research groups, which work within the medical-technical area of the university and college sector, hospitals and the institute sector. However, the program does also support researchers within the industrial sector to develop product ideas in areas where exploitation or capitalisation within the researchers' firm does not come natural.

RESERVE
Program period: 1996-2000

In the program RESERVE the focus has been comprised by improved exploration technology and well technology as well as increased degree of extraction.

UTBYGG
Program period: 1996-2000

In the program UTBYGG there has been a focus on the development of new expansion solutions at deep sea and in marginal areas comprising floating production, advanced anchoring systems, pipe solutions, under water processing, multi phase transportation and drilling technology. There has been a growing interest in platform free solutions connected to well power processing at the sea floor and inside the well.

NATURGASS (Natural gas)
Program period: 1996-2000

The NATURGASS program focus on the development of new gas related products as well as technology development for new gas conversion processes.

6.2.2 Building and construction, IT and service sectors (IE)

BA-PROGRAMMET (BYGGANL) – Program for the building and construction sector 1996-2001
Program period: 1996-2001

The BA program is to serve a sector with a great national and international market, with many R&D tasks covering various areas, from construction goods production to construction and design. The program is to contribute to create an internationally competitive and user/customer adapted building and construction industry in Norway, an industry to be attractive for recruiting the best employees.

PROGIT – ICT industry and graphic industry
Program period: 1996-2001

The goal of the PROGIT program is to promote growth and profitability in the ICT and graphic industries in Norway, and particularly prioritise R&D projects that encourage the growth potential of these industries in export markets. The effort is directed towards technological and disciplinary areas of great importance to many companies.

The projects are executed at different levels: firm projects, collaboration projects, PhD projects and pilot projects (*forprosjekter*). The target group is industrially oriented firms primarily with products (not services) based on ICT. However, the program is also open to projects and actors in between industrial and service oriented ICT activities. In the case of the graphical industry the main focus is on projects related to the utilisation of ICT in graphical products and production processes.

TYIN (TJ-INFO)
Program period: 1996-2001

TYIN (service info) is a program to strengthen the service sector and its ‘info’ structure. A good info structure is important for the possible growth of the service sector and will in it self create a basis for radically new service products and new channels for marketing and sales. The program is to contribute to increased value added, productivity and quality within the industry and commerce in general as well as in the public sector.

TYIN also deals with approaches independent of the connection between info structure and the service sector. Knowledge intensive business services (KIBS), value chains within distribution and commodity trade as well as services generated by info structure and the establishment of info structure for such services make up the main target group for the program. The TYIN projects are distributed at various levels: strategic level, branch level and firm level.

LOGITRANS – Program for logistics, IT applications and transportation
Program period: 1997-2001

The main goal of the program is to contribute to increased value added through more effective and environmental logistics and transport. This is to be achieved through an increased utilisation of IT based solutions in logistics and in personal and goods transportation. Logistics projects for the industrial sector have already been initialised, among others in collaboration with export directed sectors and individual companies both nationally and internationally. Development projects for the service sector (transport and logistics companies) are also initialised.

IT-FUNK
Program period: 1998-2002

The IT-FUNK program is directed towards firms, R&D institutions and others who develop, produce and spread IT solutions of importance for the accessibility in society in general, in other words the ones who deliver goods and services for the regular market. Funding is given to improve these products to the benefit and joy of everyone, including people with various sorts of handicaps. Producers of solutions for handicapped in particular can receive funding when the need is so exceptional that the demand cannot be met by improving standard solutions.

6.2.3 Maritime activity and goods producing industry (IE)

MARITIM – Maritime activity
Program period: 1998-2002

The cluster-oriented program MARITIM has as its goal to increase the profitability and competitiveness, competence, recruitment and education, safety and environment as well as international appliance and orientation in the maritime sector in Norway. Important R&D tasks are sea transport and logistics, ship management, shipbuilding and ship technology, as well as ship equipment and equipment technology.

VARP – R&D program for the goods producing industry
Program period: 1996-2001

The superior goal of the VARP program is to increase the productivity and through the use of R&D to strengthen the basis for development of market oriented products in the goods producing industry. The central R&D tasks balances between joint branch activities and branch specific activities, strongly focusing on product development and design, material technology, production technology and productivity. The main target group is the part of the goods producing industry made

up by the machinery, metal goods, foundry, plastics, furniture and textiles and clothing industries, but also R&D institutes, educational institutions and branch associations.

NORMIL – Program for environmental technology
Program period: 1996-2001

NORMIL focus on increasing the value added and the export of the environmental technology industry by promoting commercially profitable products and services to present and prospective markets, stimulate collaboration on development of complete system solutions as well as to strengthen the industry and R&D institutes' commitment to long term competence generation. The program is primarily directed at the industrial environmental sector and the research institutes, the industrial environmental sector being defined as firms delivering products and services to reduce or prevent environmental problems.

KLIMATEK- Technology for emission reduction of climatic gases
Program period: 1997-2001

The KLIMATEK program is focussing on the testing of technology with the possibility to reduce emission of CO2 and other climatic gases, and the main goal is to stimulate to increased use of this type of technology

6.2.4 Innovation and technology networks (IE)

NIN – National information networks
Program period: 1996-2001

The main goal of NIN is to highlight and generate effects of the utilisation of information networks in firms, to show society the usefulness of information networks used in the business life and the public sector as well as to establish durable information networks consisting actors of both sectors. The target groups of NIN are net operators, information suppliers, information refiners, network operators as well as regulatory authorities. Areas prioritised for utilisation/demonstrations are: health, distance work, regional networks, maritime and ICT supported learning.

6.2.5 BF programs

BIOT2000 (BIOT)
Program period: 1995-1999 and 2000-2004(?)

BIOT2000 is a continuation of the Biotechnology program 1995-99, and is organised in two parts, one program for researcher-oriented R&D projects and one for User oriented projects. The User oriented projects are related to the areas of biotechnology in agriculture and marine biotechnology. The User oriented part of the program prioritise the utilisation of new biological raw materials and raw materials from primary production, environmental conditions, raw material processing, new products, biotechnological use within the food industry as well as the utilisation of biotechnology in refining and fighting diseases.

FOOD PRODUCTION
Program period: 1995-1999 and 2000-2004

The program is to contribute to the strengthening of the knowledge base about food articles and food production in Norwegian research, in the food industry and the public authorities. The program has six focus areas: food quality and food safety, customer reliance, raw materials, process and technology, products as well as logistics and distribution. The User oriented part of the program (minimum 40 percent of the project funding) is to cover the whole main target group within the food industry and related supplier industry, both the ones with large R&D competence and the ones with more limited R&D experience.

FISHERY TECHNOLOGY (FISKTEK)
Program period: 1995-99 and 2000-2004

The program FISKTEK is to contribute to secure and further develop the disciplinary base of a market-oriented, environmental and resource friendly production of aquatic organisms. The vision is that the Norwegian fish farming industry is to be an internationally leading producer of aquatic food and that Norway is to be top ranked in international fishery technology research. The User oriented part of the program is headed towards individual firms, associations and branch organisations. Mainly the program 'Fish technology' is a continuation of the program 'Technology development in the fish sector' (1995-99).

MARE – Marine resources, environmental issues and management
Program period: 1995-99 and 2000-2004

The program MARE is a continuation of the programs 'Marine resources and environmental issues' and 'Marine resource management' (1995-99). MARE has a clear-cut goal to contribute to the development of marine disciplines that supports future value added within a sustainable development. The program covers a large disciplinary field and is divided into four parts: Our marine ecosystems, harvesting marine resources, resource management and bio economy as well as technology. Of a total budget 10 % of the funding shall support User oriented projects.

EARTH, PLANTS AND LIVESTOCK
Program period: 1996-1999 and 2000-2004

Starting in 2000 the program EARTH, PLANTS AND LIVESTOCK has financed research within the disciplinary areas that since 1995/96 has been covered by the programs 'Plants and earth', 'Livestock', the animal health part of 'Fish and animal health program' and the agricultural part of 'Nyskapingsprogrammet' (The innovation program). The present program is to contribute to increased knowledge for further development of the primary production in agriculture, focusing on sustainable use of input factors throughout the whole production chain. The target group of the User oriented projects is firms within agriculture or adjacent industry and relevant R&D environments.

FOREST – RESOURCES AND VALUE ADDED
Program period: 1995-99 and 2000-2004

The program FOREST is a continuation of ’The forest program’ (1995-99), and is a value chain program starting with the resource base and ending up in the society’s need for wood based goods and services. There is an assumption in the program that a considerable part of the projects are User oriented .

6.3 Statistics

Table 6.3.1. AIM customer survey: Comparison by types of respondents

Questions main study	Alternative answers	Main study: Administrative project co-ordinator No.	Main study: Administrative project co-ordinator %	Main study: Project leader No.	Main study: Project leader %	Main study: Total No.	Main study: Total %	Other participants in networks (projects) where the contract partner is a company No.	Other participants in networks (projects) where the contract partner is a company %	Other participants in networks (projects) where the contract partner is an R&D institution No.	Other participants in networks (projects) where the contract partner is an R&D institution %	TEFT No	TEFT %
Have you, before this project, taken part in projects supported by the RCN?	Yes	99	**84 %**	89	**72 %**	188	**78 %**						
	No	19	**16 %**	34	**28 %**	53	**22 %**						
Information													
What has been your main source of information when working on the application?	RCN Webpages	27	**23 %**	54	**44 %**	81	**34 %**					3	**6 %**
	Brochures and other information material from th RCN	40	**34 %**	46	**37 %**	86	**36 %**						
	Forskning and other magazines	9	**8 %**	11	**9 %**	20	**8 %**					11	**23 %**
	Other printed publications	15	**13 %**	22	**18 %**	37	**15 %**						
	Seminars and meetings	23	**20 %**	28	**23 %**	51	**21 %**					6	**13 %**
	Industrial branch	22	**19 %**	35	**28 %**	57	**24 %**					19	**40 %**

	organisations									
	Other people who have been in touch with RCN	73	**62 %**	64	**52 %**	137	**57 %**		16	**34 %**
	Contact with persons in other public institutions (e.g. SND)	28	**24 %**	29	**24 %**	57	**24 %**		14	**30 %**
	Other	48	**41 %**	47	**38 %**	95	**40 %**		8	**17 %**

Questions main study	Alternative answers	Main study: Administrative project co-ordinator No.	%	Project leader No.	%	Total No.	%	Other participants in networks (projects) where the contract partner is a company No.	%	Other participants in networks (projects) where the contract partner is an R&D institution No.	%	TEFT No	%
In connection with this project and before your company got in touch with the relevant project, did you contact…	Other IE programs	55	**59 %**	42	**42 %**	97	**51 %**						
	Other parts of RCN	48	**52 %**	38	**38 %**	86	**45 %**						
	SND	46	**49 %**	32	**32 %**	78	**41 %**						
	Eksportrådet	39	**42 %**	12	**12 %**	51	**27 %**						
	Other	34	**37 %**	45	**45 %**	79	**41 %**						
Did these contacts guide you to the right place?	Yes	68	**73 %**	77	**79 %**	145	**76 %**						
	No	25	**27 %**	21	**21 %**	46	**24 %**						
Advice													
Have you discussed the challenges facing your project with the RCN… … before your application was granted?	Yes	82	**69 %**	87	**71 %**	169	**70 %**					42	**84 %**
	No	36	**31 %**	35	**29 %**	71	**30 %**					8	**16 %**
…after the project got support?	Yes	76	**65 %**	79	**64 %**	155	**65 %**					36	**72 %**
	No	41	**35 %**	44	**36 %**	85	**35 %**					14	**28 %**

Was project planning/design/organisation discussed?	Yes	77	**66 %**	91	**76 %**	168	**71 %**			43	**88 %**
	No	35	**30 %**	24	**20 %**	59	**25 %**			5	**10 %**
	Don't know	5	**4 %**	5	**4 %**	10	**4 %**			1	**2 %**
Was the technological feasibility of the project discussed?	Yes	64	**55 %**	73	**61 %**	137	**58 %**			41	**84 %**
	No	48	**41 %**	41	**34 %**	89	**38 %**			7	**14 %**
	Don't know	5	**4 %**	6	**5 %**	11	**5 %**			1	**2 %**
Was the resource-oriented feasibility discussed?	Yes	71	**61 %**	70	**58 %**	141	**59 %**			42	**86 %**
	No	43	**37 %**	43	**36 %**	86	**36 %**			7	**14 %**
	Don't know	3	**3 %**	7	**6 %**	10	**4 %**			0	**0 %**
Was the possibility of protecting results from the project (e.g. patenting) discussed?	Yes	42	**36 %**	32	**27 %**	74	**31 %**			11	**22 %**
	No	67	**57 %**	84	**70 %**	151	**64 %**			38	**78 %**
	Don't know	8	**7 %**	4	**3 %**	12	**5 %**			0	**0 %**
Was the market potential of the project discussed?	Yes	71	**61 %**	77	**64 %**	148	**62 %**			35	**71 %**
	No	41	**35 %**	39	**33 %**	80	**34 %**			14	**29 %**
	Don't know	5	**4 %**	4	**3 %**	9	**4 %**			0	**0 %**
What was the main reason that … was not discussed?	Didn't feel the need	38	**44 %**	36	**38 %**	74	**41 %**			23	**53 %**
	Got no offer from RCN	13	**15 %**	12	**13 %**	25	**14 %**			2	**5 %**
	The RCN has nothing to contribute	11	**13 %**	5	**5 %**	16	**9 %**			1	**2 %**
	Not relevant for this project	34	**40 %**	50	**53 %**	84	**46 %**			15	**35 %**
	Other	21	**24 %**	16	**17 %**	37	**20 %**			2	**5 %**

Have you experienced that RCN has contacted you unsolicited?	Yes	49	**42 %**	63	**51 %**	112	**46 %**			33	**66 %**
	No	67	**57 %**	59	**48 %**	126	**52 %**			17	**34 %**
	Don't know	2	**2 %**	1	**1 %**	3	**1 %**				

Questions main study	Alternative answers	Main study: Administrative project co-ordinator No.	%	Project leader No.	%	Total No.	%	Other participants in networks (projects) where the contract partner is a company No.	%	Other participants in networks (projects) where the contract partner is an R&D institution No.	%	TEFT No	%
Establishment of co-operation and networks													
Did you get help to the establishment/development of R&D co-operation before RCN granted support?	Yes	29	**25 %**	40	**34 %**	69	**30 %**						
	No	86	**75 %**	78	**66 %**	164	**70 %**						
Did you get help to the establishment/development of R&D co-operation after RCN granted support?	Yes	29	**25 %**	37	**31 %**	66	**28 %**						
	No	85	**75 %**	84	**69 %**	169	**72 %**						
Did you get help for establishment/development of R&D before, after or both before and after RCN granted support?	Yes	39	**34 %**	52	**43 %**	91	**39 %**	23	**61 %**	12	**46 %**	24	**53 %**
	No	76	**66 %**	69	**57 %**	145	**61 %**	13	**34 %**	10	**38 %**	21	**47 %**
	Don't know							2	**5 %**	4	**15 %**		
Network quality													
With the experience and knowledge you have today, are there others that should have been part in the project network?	Yes	27	**39 %**	40	**58 %**	67	**48 %**	21	**55 %**	14	**54 %**		
	No	43	**61 %**	29	**42 %**	72	**52 %**	17	**45 %**	12	**46 %**		

Questions main study	Alternative answers	Main study: Administrative project co-ordinator No.	%	Project leader No.	%	Total No.	%	Other participants in networks (projects) where the contract partner is a company No.	%	Other participants in networks (projects) where the contract partner is an R&D institution No.	%	TEFT No	%
Follow up													
After the project ended, has RCN helped market the results?	Yes	13	**22 %**	12	**19 %**	25	**20 %**					3	**8 %**
	No	41	**71 %**	49	**77 %**	90	**74 %**					27	**68 %**
	Don't know	4	**7 %**	3	**5 %**	7	**6 %**					10	**25 %**
…create contacts with other parties?	Yes	15	**25 %**	14	**22 %**	29	**24 %**					6	**15 %**
	No	40	**68 %**	47	**73 %**	87	**71 %**					23	**59 %**
	Don't know	4	**7 %**	3	**5 %**	7	**6 %**					10	**26 %**
…develop the project further?	Yes	12	**20 %**	17	**27 %**	29	**24 %**					9	**23 %**
	No	40	**68 %**	46	**72 %**	86	**70 %**					20	**51 %**
	Don't know	7	**12 %**	1	**2 %**	8	**7 %**					10	**26 %**
…uset other parts of the public sector(e.g.. SND; Eksportrådet)?	Yes	5	**8 %**	11	**18 %**	16	**13 %**					9	**23 %**
	No	50	**85 %**	48	**77 %**	98	**81 %**					18	**46 %**
	Don't know	4	**7 %**	3	**5 %**	7	**6 %**					12	**31 %**

Questions main study	Alternative answers	Main study: Administrative project co-ordinator No.	%	Project leader No.	%	Total No.	%	Other participants in networks (projects) where the contract partner is a company No.	%	Other participants in networks (projects) where the contract partner is an R&D institution No.	%	TEFT No	%
Additionality													
Has the participation of the RCN actually contributed to the implementation of this project?	Yes	92	**78 %**	100	**82 %**	192	**80 %**					38	**76 %**
	No	24	**20 %**	22	**18 %**	46	**19 %**					8	**16 %**
	Don't know	2	**2 %**	0	**0 %**	2	**1 %**					4	**8 %**
…that the project was finalized earlier?	Yes	73	**62 %**	66	**54 %**	139	**58 %**					32	**64 %**
	No	43	**36 %**	55	**45 %**	98	**41 %**					15	**30 %**
	Don't know	2	**2 %**	2	**2 %**	4	**2 %**					3	**6 %**
…an increase in the resource allocations from your enterprise?	Yes	81	**69 %**	88	**72 %**	169	**70 %**					33	**66 %**
	No	34	**29 %**	35	**28 %**	69	**29 %**					15	**30 %**
	Vet ikke	2	**2 %**	0	**0 %**	2	**1 %**					2	**4 %**
…increased c-operation with others (companies, R&D institutions)	Yes	86	**73 %**	87	**71 %**	173	**72 %**					33	**66 %**
	No	32	**27 %**	36	**29 %**	68	**28 %**					15	**30 %**
	Don't know	0	**0 %**	0	**0 %**	0	**0 %**					2	**4 %**
…changes in the project?	Yes	50	**42 %**	52	**42 %**	102	**42 %**					19	**38 %**
	No	67	**57 %**	68	**55 %**	135	**56 %**					29	**58 %**
	Don't know	1	**1 %**	3	**2 %**	4	**2 %**					2	**4 %**

…improved project quality?	Yes	60	**51 %**	66	**54 %**	126	**53 %**			30	**60 %**
	No	49	**42 %**	51	**42 %**	100	**42 %**			10	**20 %**
	Don't know	8	**7 %**	5	**4 %**	13	**5 %**			10	**20 %**
…strengthened degree of innovation?	Yes	46	**39 %**	55	**45 %**	101	**42 %**			23	**47 %**
	No	63	**53 %**	67	**55 %**	130	**54 %**			21	**43 %**
	Don't know	9	**8 %**	1	**1 %**	10	**4 %**			5	**10 %**
…increased research content?	Yes	58	**49 %**	68	**55 %**	126	**52 %**			25	**50 %**
	No	56	**47 %**	52	**42 %**	108	**45 %**			22	**44 %**
	Don't know	4	**3 %**	3	**2 %**	7	**3 %**			3	**6 %**
…changes in size of project?	Yes	66	**56 %**	65	**53 %**	131	**54 %**			15	**30 %**
	No	51	**43 %**	57	**46 %**	108	**45 %**			34	**68 %**
	Don't know	1	**1 %**	1	**1 %**	2	**1 %**			1	**2 %**

Source: AIM

Table 6.3.2: Industrial results IE programs 1999

	Achieved project results			No of projects that have contributed to			New activities	
	Finished new and improved products	Regsitered patents	Signed licence contracts	New And/or improved products	New and/or improved processes	New and/or improved services	New companies established as result of IE projects	New Business-activity in existing companies
EFFEKT	38	4	1	15	14	2	3	6
NYTEK	30	2		23	7	4		12
Total energy sector	**68**	**6**	**1**	**38**	**21**	**6**	**3**	**18**
NATURGASS	9	4	1	3	1		1	
OFFSHORE 2010	48	7	9	30	12	19		8
Total petroleum sector	**57**	**11**	**10**	**33**	**13**	**19**	**1**	**8**
Total energy/petroleum	**125**	**17**	**11**	**71**	**34**	**25**	**4**	**26**
KLIMATEK	7	2	1	5	7	2		4
NORMIL	28	5	3	17	22	5	1	8
P 2005	3				5			
PROGIT	66	23	2	50	20	2	4	7
VARP	29	6	1	17	18	9		1
Total ICT and manufacturing	**133**	**36**	**7**	**89**	**72**	**18**	**5**	**20**
MARITIM	47	9		47	29	14	3	3
Total maritime sector	**47**	**9**	**0**	**47**	**29**	**14**	**3**	**3**
BA-programt	108	2		91	17	21	3	1
Total construction	**108**	**2**	**0**	**91**	**17**	**21**	**3**	**1**
PROSMAT	166	30	7	49	23	27	2	11
Total process industry	**166**	**30**	**7**	**49**	**23**	**27**	**2**	**11**
KAPBIO	1	2		2	1		1	1

Sum bio/næringsmidler	**1**	**2**	**0**	**2**	**1**	**0**	**1**	**1**
LOGITRANS	18			4	17	1		1
TYIN	26		2	9	11	14	1	7
Total services	**44**	**0**	**2**	**13**	**28**	**15**	**1**	**8**
BRO-programt			1	21	23	22	2	10
BU 2000	13							
FAKTA	1				1	1		1
NIN	8			7	6	7		2
Total branch independent measures	**22**	**0**	**0**	**28**	**30**	**30**	**2**	**13**
Total all programs	**646**	**96**	**27 0**	**390**	**234**	**150**	**21**	**83**

Source RCN IE

Table 6.3.3. Scientific results 1999 IE programs

Sectors under the Ministries of Trade and Industry and Oil and Energy	Vitenskapelige/faglige publikasjoner					Doctorate education			Dissemination of results		
	Articles in science journals w/referee	Articles In other science and trade periodicals	Published books (education, analogies etc.)	Published lectures from Internat. conferences	Other reports and lectures from relevant meetings	No. of scholarships with IE financing	performed R&D man years 1999	Finished PhDs 1999	Dissemination towards relevant target groups	Dissemination towards general public	Reports in mass-media
EFFEKT	23	54	2	131	245	23	22,8	2	128	52	37
NYTEK	6	18	1	19	43	19	10,1	1	36	17	1
Total energy sector	**29**	**72**	**3**	**150**	**288**	**42**	**32,9**	**3**	**164**	**69**	**38**
NATURGASS	2	5		12	32	15	13,8	1	29	2	7
OFFSHORE 2010	36	7		38	103	13	8,0	5	86	20	11
Total petroleum sector	**38**	**12**	**0**	**50**	**135**	**28**	**21,7**	**6**	**115**	**22**	**18**
Total energy/petroleum	**67**	**84**	**3**	**200**	**423**	**70**	**54,6**	**9**	**279**	**91**	**56**
KLIMATEK	2	11		10	39	1	1,0		56	20	32
NORMIL	6	11	4	27	59	2	2,0		62	15	19
P 2005	6		1	22	43	9	5,3		11	5	5
PROGIT	15	27		108	102	26	22,2		132	40	66
VARP	4	8	2	13	92	16	11,8	2	28	12	14
Total IT and manufacturing	**33**	**57**	**7**	**180**	**335**	**54**	**42,2**	**2**	**289**	**92**	**136**
MARITIM	3			3	69	7	5,1	4	33	15	11
Total maritime sector	**3**	**0**	**0**	**3**	**69**	**7**	**5,1**	**4**	**33**	**15**	**11**
BA-programt	4	21	10	8	163	18	11,9	3	120	19	50
Total construction	**4**	**21**	**10**	**8**	**163**	**18**	**11,9**	**3**	**120**	**19**	**50**
PROSMAT	101	20	6	113	425	94	81,4	20	130	46	24
Total process industry	**101**	**20**	**6**	**113**	**425**	**94**	**81,4**	**20**	**130**	**46**	**24**
KAPBIO									3		
Total bioproduction/food	**0**	**0**	**0**	**0**	**0**	**0**	**0,0**	**0**	**3**	**0**	**0**
LOGITRANS		15	1	8	34	3	2,0		32	6	15
TYIN	11	8	5	16	47	11	9,8	1	116	28	40
Total services	**11**	**23**	**6**	**24**	**81**	**14**	**11,8**	**1**	**148**	**34**	**55**

BRO-programt				4	14				72	31	50
BU 2000	10	15	13	24	34	9	7,6	2	80	8	10
FAKTA	3	1		2	12	2	1,1		11	2	3
NIN	3	8		3	23				33	14	18
Total branch independent measures	**16**	**24**	**13**	**33**	**83**	**11**	**8,7**	**2**	**196**	**55**	**81**
Total all programs	**235**	**229**	**45**	**561**	**1 579**	**268**	**215,7**	**41**	**1 198**	**352**	**413**

Table 6.3.4: IE projects divided on RCN main priority focus areas (hovedinnsatsområder) *1999, percentage and NOK 1000. Projects may be part of more than one focus area.*

	Project-allocation 1999 1000 kr.	Basic research		Highly qualified personell		International R&D co-operation		Industry-oriented R&D		R&D for increased value creation in the public sector		Marine R&D *(marin & maritime)*		Medicine and health		R&D for the enviironment		ICT (applied research and development)	
BA-programt	32 825	5 %	1 793	26 %	8 549	9 %	2 841	55 %	18 100	22 %	7 059	0 %	155	0 %	55	18 %	5 841	13 %	4 262
BRO-programt	76 206	0 %	0	11 %	8 648	3 %	2 009	34 %	25 772	0 %	0	0 %	0	0 %	0	0 %	0	11 %	8 533
BU 2000	12 350	0 %	0	27 %	3 355	4 %	435	100 %	12 350	2 %	300	23 %	2 790	0 %	0	0 %	0	10 %	1 215
EFFEKT	34 456	2 %	717	12 %	4 260	18 %	6 264	95 %	32 847	0 %	0	5 %	1 786	3 %	872	17 %	5 840	14 %	4 926
FAKTA	3 840	0 %	0	33 %	1 270	11 %	409	99 %	3 792	5 %	204	0 %	0	0 %	0	0 %	0	0 %	0
KAPBIO	2 767	0 %	0	0 %	0	19 %	513	100 %	2 767	0 %	0	0 %	0	99 %	2 736	0 %	0	0 %	0
KLIMATEK	25 719	0 %	94	61 %	15 597	13 %	3 220	99 %	25 359	2 %	500	9 %	2 278	0 %	0	100 %	25 719	28 %	7 114
LOGITRANS	14 634	7 %	1 018	0 %	0	6 %	867	87 %	12 684	10 %	1 467	2 %	341	0 %	0	6 %	904	32 %	4 689
MARITIM	50 069	4 %	1 850	17 %	8 646	19 %	9 625	99 %	49 335	0 %	90	99 %	49 489	0 %	129	12 %	6 200	46 %	22 787
NATURGASS	13 969	38 %	5 280	46 %	6 422	14 %	1 991	73 %	10 205	2 %	260	0 %	0	0 %	0	21 %	3 002	0 %	56
NIN	34 628	4 %	1 222	81 %	27 936	8 %	2 803	70 %	24 149	28 %	9 818	9 %	3 216	4 %	1 381	1 %	200	61 %	21 213
NORMIL	14 868	8 %	1 225	79 %	11 761	4 %	645	88 %	13 153	5 %	750	0 %	0	5 %	714	95 %	14 155	24 %	3 602
NYTEK	25 771	17 %	4 450	81 %	20 803	28 %	7 312	90 %	23 256	4 %	918	0 %	50	0 %	30	51 %	13 041	21 %	5 329
OFFSHORE 2010	39 142	3 %	1 225	6 %	2 440	15 %	5 959	97 %	37 884	1 %	356	41 %	16 072	0 %	0	40 %	15 557	61 %	24 019
P 2005	13 682	1 %	200	83 %	11 323	12 %	1 683	89 %	12 119	9 %	1 174	0 %	0	0 %	0	24 %	3 259	8 %	1 126
PROGIT	87 803	19 %	16 644	43 %	37 608	22 %	19 490	95 %	83 608	2 %	1 755	1 %	824	3 %	3 008	5 %	4 370	98 %	85 946
PROSMAT	98 117	0 %	0	28 %	27 626	17 %	16 835	100 %	97 997	0 %	0	0 %	310	19 %	18 971	19 %	18 800	18 %	17 447
TYIN	41 995	10 %	4 167	79 %	33 097	13 %	5 411	61 %	25 717	11 %	4 639	2 %	946	1 %	297	2 %	801	54 %	22 559
VARP	31 688	8 %	2 525	36 %	11 537	8 %	2 439	94 %	29 664	0 %	0	1 %	240	2 %	569	4 %	1 360	21 %	6 658
Sum alle prog.	**654 529**		**42 410**		**240 878**		**90 751**		**540 758**		**29 290**		**78 497**		**28 762**		**119 049**		**241 481**

Source: RCN IE

Table 6.3.5: RCN IE projects 2000 sorted according to main priority areas of the latest government white paper on research (St. meld. Nr. 39 1998-99 Forskning ved et tidsskille*)*

White paper area	No. of projects	% of projects	Allocation NOK 1000	% of allocations
Marine R&D (incl. equipment and infrastructure)	20	3%	9.732	1%
ICT	273	35%	226.093	35%
Medicine and health	28	4%	28.195	4%
Border-area energy and the environment	209	26%	140.879	22%
Projects not targeting a white paper area	259	33%	244.922	38%
Total	790		649823	

Source: RCN IE

6.4 Questionnaires

6.4.1 For contract partner firms

Til bedrifter med prosjektstøtte gjennom et av Norges forskningsråds brukerstyrte programmer

'Bedrift' i dette spørreskjemaet refererer til den enhet som har vært kontraktspart eller samarbeidspartner i et prosjekt med støtte fra Norges forskningsråd, og som er nevnt ved navn under. Opplysningene som gis skal gjelde for denne enheten, og ikke det foretak eller konsern som bedriften eventuelt er del av.

1 Vennligst fyll ut det som mangler om bedriften og rett opp eventuelle feil:

Navn:
Prosjektleder:
Prosjektnummer:
Prosjekttittel:
Organisasjonsnummer:
Næringskategori (se rubrikk under):

1.Jordbruk, skogbruk, fiske og fangst **2**.Bergverksdrift **3**.Utvinning av råolje og gass **4**.Næringsmidler og tobakk **5**.Lær og lærvarer **6**.Trevarer **7**.Papirmasse ol. og grafisk **8**.Kull og petroleumsvirksomhet **9**.Kjemikalier og kjemiske prod. **10**.Gummi og plastvarer **11**.Glass og glass prod. **12**.Metaller **13**.Metallvarer **14**.Maskiner og utstyr **15**.Kontor og datamaskiner **16**.Andre elektriske maskiner og app. **17**.Radio-fjernsyn og kommunikasjonsutstyr **18**.Medisinske-, presisjon-, og optiske instr. **19**.Motorkjøretøyer, tilh. og deler **20**.Andre transportmidler **21**. Møbler og annen industriproduksjon **22**.Kraft og vannforsyning **23**.Bygge- og anleggsvirksomhet **24**. Handel- og hotellvirksomhet **25**.Transporttjenester **26**. Kommunikasjonstjenester **27**. Bank, forsikring, andre finansielle tjenester. **28**.Konsulentvirksomhet, IT **29**.FoU, naturvit/teknikk, samf.vitenskap **30**. Annen tjenesteyting. **31**.Undervisning **32**. Helsetjenester

DEL I:

Spørsmålene i DEL I av spørreskjemaet gjelder den bedriften som er kontraktspartner med Norges forskningsråd i prosjektet nevnt over.

2 Vennligst fyll ut for bedriften for 1998, 2000 og forventninger for 2002 (merk: ikke konsern-/foretaksnivå):

	1998	2000	Forventet 2002
Antall fulltids sysselsatte (i årsverk)			
Omsetning (i 1000 kr)			
Andel eksport av omsetning	%	%	%

3 Hva slags type innovasjoner har bedriften introdusert i perioden 1998-2000?

Kryss av for hvert punkt:	Ja	Nei
Har bedriften utviklet (for bedriften) nye eller foretatt vesentlige endringer på eksisterende produkter eller tjenester?		
Tok bedriften i bruk (for bedriften) teknologisk nye eller forbedrede prosesser (nye måter å framstille produkter eller tjenester på)?		
Utførte bedriften aktiviteter for å utvikle eller introdusere (for bedriften) teknologisk nye eller forbedrede produkter/tjenester/prosesser som mislyktes eller som ennå ikke er ferdigstilt?		
Introduserte bedriften noen nye eller forbedrede produkter/tjenester som også var nye for markedet?		

Hvis 'nei' på alle punkter i sp. 3, vennligst gå direkte til DEL II (s. 3)

Vær vennlig å gi et anslag for bedriftens omsetning i år 2000 fordelt på følgende produktgrupper:

Kan ikke fordele omsetningen ☐

	Prosent
For bedriften nye produkter/tjenester i perioden 1998-2000	%
For bedriften forbedrede produkter/tjenester i perioden 1998-2000	%
Uforandrede eller lite endrede produkter/tjenester i perioden 1998-2000	%
	100%

4 Hvilke innovasjonsaktiviteter utførte bedriften i år 2000?

Kan ikke fordele kostnadene ☐

Vennligst kryss av, og fyll ut aktuelle kostnader:	Ja	Anslått kostnad år 2000 (i 1000 kr)		Nei
Forskning og utvikling i egen bedrift (intern FoU)				
Anskaffelse av FoU-tjenester (ekstern FoU)				
Anskaffelse av maskiner og utstyr knyttet til produkt- og prosessinnovasjoner				
Anskaffelse av annen ekstern teknologi knyttet til produkt- og prosessinnovasjoner				
Industriell design og andre forbedringer i produksjonen av teknologisk nye eller forbedrede produkter				
Kompetanseoppbygging i direkte tilknytning til teknologiske innovasjoner				
Markedsintroduksjon av teknologiske innovasjoner				
Totale innovasjonskostnader:				

5 Hvor stor andel av bedriftens totale innovasjonskostnader er finansiert gjennom prosjektstøtte fra Forskningsrådet i årene 1998 til 2000:

1998	1999	2000
%	%	%

6 Hvem hadde bedriften innovasjonssamarbeid med i perioden 1998-2000, og hvor er disse lokalisert?

Kryss av for relevante samarbeidspartnere:	Norge	EU	Utenfor EU	Ikke samarbeid
Andre bedrifter i samme konsern				
Konkurrenter				
Kunder				
Konsulentbedrifter				
Leverandører av utstyr, materiell, komponenter eller dataprogram				
Universiteter og høyskoler				
Offentlige eller private (non-profit) forskningsinstitutter				

DEL II: Spørsmål knyttet til det spesifikke prosjekt:

Prosjektnummer:
Prosjekttittel:

7 Vær vennlig å fordele prosjektets ulike finansieringskilder:

	I tusen kroner
Egenfinansiering fra deltakende bedrifter	
De samarbeidende bedriftenes kjøp av FoU-tjenester av instituttet (gruppen/avdelingen)	
Instituttets (gruppens/avdelingens) egenfinansiering	
Norges forskningsråd	
Annen offentlig finansiering (f. eks SND, departementer osv)	
Offentlig tjenesteytende virksomhet	
Andre norske bedrifters kjøp av tjenester av de samarbeidende bedriftene	
Andre utenlandske bedrifter	
Annen utenlandsk finansiering	
Annet	
TOTALT	

8 Hvilke industrielle resultater har prosjektet resultert i for hhv. kontrakts-partnerbedriften og hele prosjektet?

Vennligst angi antall:

	Nye patent-søknader	Lisens-kontrakter	*Nye prototyper*	*Nye produkter /tjenester*	Nye prosesser, metoder, modeller	Nyetableringer
Kontraktpartnerbedriften						
Prosjektet som helhet						

9 Hvilke vitenskapelige resultater har prosjektet resultert i for kontraktpartnerbedriften og prosjektet som helhet?

Vennligst angi antall:

	Dr. grader avlagt	Vitenskapelige artikler i referee-tidsskrifter	***Rapporter el. artikler i andre faglige tidsskrifter***	***Bøker o.l***	Presentasjon av 'papers' på internasjonale konferanser
Kontraktpartnerbedriften					
Prosjektet som helhet					

10 Hvordan vil du karakterisere de ulike effektene prosjektet har hatt eller forventes å få for kontraktspartnerbedriften i løpet av de 2-3 første årene etter avslutning av prosjektet?

Kryss av hvis effekten ikke er relevant, om effekten allerede er oppnådd og angi forventning fra 1= liten effekt til 3= stor effekt	Ikke relevant	Allerede oppnådd	Forventes i løpet av 2-3 år		
			1	2	3
Styrket konkurranseevne					
Økt produktivitet					
Økt omsetning					
Tilgang på nye markeder					
Økt markedsandel på eksisterende marked					
Forbedret evne til å bruke forskningsbasert kunnskap og teknologi fra universiteter/ høgskoler og forskningsinstitutter og samarbeide med disse					
Forbedret evne til å vurdere, bruke og styre leverandører av konsulenttjenester					
Forbedret evne til å samarbeide med andre leverandører					
Forbedret evne til å samarbeide med konkurrenter					
Styrking av eksisterende kunnskapsbase					
Ansettelse av medarbeidere med ny spesialkompetanse i virksomheten					
Økt andel FoU-ansatte					
Økt kompetansenivå blant FoU-ansatte					
Utløsning av interne FoU-midler					
Fra kortsiktig til langsiktig FoU					
Større sannsynlighet for utvikling av nye FoU-prosjekter					
Økt evne til praktisk problemløsning					
Dypere forståelse av virksomhetens viktigste (teknologiske) område (core technology area)					
Utforskning av nye, alternative (teknologiske) retninger (technology paths)					

11 Er prosjektet et samarbeidsprosjekt mellom flere bedrifter? Ja ☐ Nei ☐

Hvis 'nei' gå direkte til sp. 16 (s. 6)

12 Hvilke bedrifter har deltatt i prosjektet (utenom kontraktspartner), hvilken næringskategori tilhører disse og hvilken tilknytning har de hatt til prosjektet?

Fyll ut navn, næringskategori (se rubrikk s. 1) og kryss av tilknytningsform for hver samarbeidspartner:

		Tilknytning:	
Navn:	Næringskategori:	Formell	Uformell

Hvis flere samarbeidspartnere, bruk baksiden av spørreskjemaet!

13 Hvordan vil du på vegne av <u>hele prosjektet</u> vurdere de ulike effektene prosjektet har hatt eller forventes å få i løpet av de 2-3 første årene etter avslutning av prosjektet?

Kryss av hvis effekten ikke er relevant, om effekten allerede er oppnådd og angi forventning fra 1= liten effekt til 3= stor effekt	Ikke relevant	Allerede oppnådd	Forventes i løpet av 2-3 år		
			1	2	3
Styrket konkurranseevne					
Økt produktivitet					
Økt omsetning					
Tilgang på nye markeder					
Økt markedsandel på eksisterende marked					
Forbedret evne til å bruke forskningsbasert kunnskap og teknologi fra universiteter/ høgskoler og forskningsinstitutter og samarbeide med disse					
Forbedret evne til å samarbeide med andre leverandører					
Forbedret evne til å samarbeide med konkurrenter					
Styrking av eksisterende kunnskapsbase					
Ansettelse av medarbeidere med ny spesialkompetanse i virksomheten					
Økt andel FoU-ansatte					
Økt kompetansenivå blant FoU-ansatte					
Utløsning av interne FoU-midler					
Fra kortsiktig til langsiktig FoU					
Større sannsynlighet for utvikling av nye FoU-prosjekter					
Økt evne til praktisk problemløsning					
Dypere forståelse av virksomhetens viktigste (teknologiske) område (core technology area)					
Utforskning av nye, alternative (teknologiske) retninger (technology paths)					

14 Hvor viktig har ulike former for kunnskapsoverføring vært i samarbeidet mellom partene i prosjektet?

Vennligst kryss av for 1=lite viktig til 3=svært viktig	1	2	3	Ikke relevant
Praktisk arbeid				
Utveksling av personell				
Møter/presentasjoner				
Opplæringsprogram eller kurs				
Skriftlig dokumentasjon som rapporter, spesifikasjoner, tekniske tegninger og lignende				
Leveranser av prototyper eller ferdige produktkomponenter				

15 Etter at prosjektet ble avsluttet, har Forskningsrådet hjulpet til å…

Vennligst kryss av for hvert punkt:	Ja	Nei	Vet ikke
…utvikle prosjektet videre?			
…utnytte mulighetene i det øvrige virkemiddelapparatet (f.eks SND, Eksportrådet)?			
…spre de vitenskapelige resultatene fra prosjektet?			

Prosjektet er ikke avsluttet ☐

16 Har Forskningsrådet bidratt med veiledning eller annen rådgivning til prosjektet?

Kryss av for hver linje, på begge tidsangivelsene	På søknads-tidspunktet			I løpet av prosjekt-perioden			
	Ja	Nei	Vet ikke	Ja	Nei	Vet ikke	Ikke relevant
Prosjektets planlegging/utforming							
Prosjektets tekniske gjennomførbarhet							
Prosjektets ressursmessige gjennomførbarhet							
Muligheter for å beskytte resultater fra prosjektet (f. eks patenteringsmuligheter)							
Prosjektets markedspotensial							
Til å finne relevante samarbeidspartnere i prosjektet							

17 Hvor tilfreds er du som prosjektleder på vegne av prosjektet som helhet med Forskningsrådets hjelp til å etablere dialog eller nettverk med eksterne aktører i forbindelse med prosjektet?

Sett ett kryss for hver linje, hvor 1=lite tilfreds og 3= svært tilfreds

	1	2	3	Ikke relevant
Andre bedrifter				
Konsulentbedrifter				
Offentlig sektor				
Forskningsinstitutter				
Universiteter/høyskoler				

18 Hva ville skjedd med prosjektet hvis Forskningsrådet ikke hadde gitt støtte?

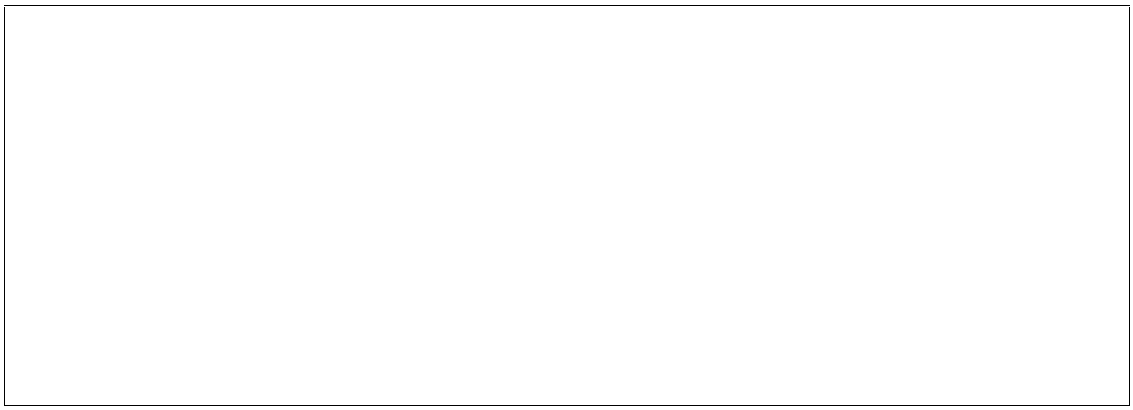
Sett kun ett kryss:

Gjennomført prosjektet uten endringer; samme skala og tidsskjema	
Gjennomført prosjektet i samme skala, men på et senere tidspunkt	
Gjennomført prosjektet, men i mer begrenset skala	
Lagt prosjektet på is / ventet	
Henlagt prosjektet	
Vet ikke	

19 Alt tatt i betraktning, hvor passende er følgende beskrivelser som karakteristikk av prosjektets erfaring med Norges forskningsråd?

Kryss av for 1 = svært lite passende til 3 = svært passende	1	2	3
Prosjektet er tilfreds med den generelle informasjonen om Forskningsrådets virksomhet, og om programmene			
Behandlingstid var tilfredsstillende			
Prosjektvurdering var tilfredsstillende			
Forskningsrådets krav til økonomisk og faglig rapportering står i forhold til den finansielle bistanden som er gitt			
Forskningsrådets forskningsprioriteringer (f. eks deres programstruktur) er godt tilpasset de prosjektdeltakende virksomhetenes forskningsbehov			
Utbetalinger fra Forskningsrådet er godt tilpasset prosjektets fremdrift			
Vurdering og beslutningsprosess ble gjennomført av Norges forskningsråd på en effektiv og formålstjenlig måte			
Forskningsrådet har bidratt til etablering av viktige nettverk med andre bedrifter eller institusjoner			
Forskningsrådet har bidratt til et grunnlag for framtidig nyskaping, omstilling og konkurranseevne i de prosjektdeltakende virksomhetene			

20 Helt til slutt, hva mener du på vegne av hele prosjektet at Norges forskningsråd bør jobbe mer med for å gi et bedre tilbud til sine kunder?



6.4.2 For co-operating partner firms

Til bedrifter med prosjektstøtte gjennom et av Norges forskningsråds brukerstyrte programmer

'Bedrift' i dette spørreskjemaet refererer til den enhet som har vært samarbeidspartner i et prosjekt med støtte fra Norges forskningsråd, og som er nevnt ved navn under. Opplysningene som gis skal gjelde for denne enheten, og ikke det foretak eller konsern som bedriften eventuelt er del av.

1 Vennligst fyll ut det som mangler om bedriften og rett opp eventuelle feil:

Navn:

Prosjektnummer:
Prosjekttittel:
Organisasjonsnummer:
Næringskategori (se rubrikk under):

1.Jordbruk, skogbruk, fiske og fangst **2**.Bergverksdrift **3**.Utvinning av råolje og gass **4**.Næringsmidler og tobakk **5**.Lær og lærvarer **6**.Trevarer **7**.Papirmasse ol. og grafisk **8**.Kull og petroleumsvirksomhet **9**.Kjemikalier og kjemiske prod. **10**.Gummi og plastvarer **11**.Glass og glass prod. **12**.Metaller **13**.Metallvarer **14**.Maskiner og utstyr **15**.Kontor og datamaskiner **16**.Andre elektriske maskiner og app. **17**.Radio-fjernsyn og kommunikasjonsutstyr **18**.Medisinske-, presisjon-, og optiske instr. **19**.Motorkjøretøyer, tilh. og deler **20**.Andre transportmidler **21**. Møbler og annen industriproduksjon **22**.Kraft og vannforsyning **23**.Bygge- og anleggsvirksomhet **24**. Handel- og hotellvirksomhet **25**.Transporttjenester **26**. Kommunikasjonstjenester **27**. Bank, forsikring, andre finansielle tjenester. **28**.Konsulentvirksomhet, IT **29**.FoU, naturvit/teknikk, samf.vitenskap **30**. Annen tjenesteyting. **31**.Undervisning **32**. Helsetjenester

DEL I:

2 Vennligst fyll ut for bedriften for 1998, 2000 og forventninger for 2002 (merk: ikke konsern-/foretaksnivå):

	1998	2000	Forventet 2002
Antall fulltids sysselsatte (i årsverk)			
Omsetning (i 1000 kr)			
Andel eksport av omsetning	%	%	%

3 Hva slags type innovasjoner har bedriften introdusert i perioden 1998-2000?

Kryss av for hvert punkt:	Ja	Nei
Har bedriften utviklet (for bedriften) nye eller foretatt vesentlige endringer på eksisterende produkter eller tjenester?		
Tok bedriften i bruk (for bedriften) teknologisk nye eller forbedrede prosesser (nye måter å framstille produkter eller tjenester på)?		
Utførte bedriften aktiviteter for å utvikle eller introdusere (for bedriften) teknologisk nye eller forbedrede produkter/tjenester/prosesser som mislyktes eller som ennå ikke er ferdigstilt?		
Introduserte bedriften noen nye eller forbedrede produkter/tjenester som også var nye for markedet?		

Hvis 'nei' på alle punkter i sp. 3, vennligst gå direkte til DEL II (s. 3)

4 Vær vennlig å gi et anslag for bedriftens omsetning i år 2000 fordelt på følgende produktgrupper:

Kan ikke fordele omsetningen ☐

	Prosent
For bedriften nye produkter/tjenester i perioden 1998-2000	%
For bedriften forbedrede produkter/tjenester i perioden 1998-2000	%
Uforandrede eller lite endrede produkter/tjenester i perioden 1998-2000	%
	100%

5 Hvilke innovasjonsaktiviteter utførte bedriften i år 2000?

Kan ikke fordele kostnadene ☐

Vennligst kryss av, og fyll ut aktuelle kostnader:	Ja	Anslått kostnad år 2000 (i 1000 kr)		Nei
Forskning og utvikling i egen bedrift (intern FoU)				
Anskaffelse av FoU-tjenester (ekstern FoU)				
Anskaffelse av maskiner og utstyr knyttet til produkt- og prosessinnovasjoner				
Anskaffelse av annen ekstern teknologi knyttet til produkt- og prosessinnovasjoner				
Industriell design og andre forbedringer i produksjonen av teknologisk nye eller forbedrede produkter				
Kompetanseoppbygging i direkte tilknytning til teknologiske innovasjoner				
Markedsintroduksjon av teknologiske innovasjoner				
Totale innovasjonskostnader:				

6 Hvor stor andel av bedriftens totale innovasjonskostnader er finansiert gjennom prosjektstøtte fra Forskningsrådet i årene 1998 til 2000:

1998	1999	2000
%	%	%

7 Hvem hadde bedriften innovasjonssamarbeid med i perioden 1998-2000, og hvor er samarbeidspartneren lokalisert?

Kryss av for relevante samarbeidspartnere:	Norge	EU	Utenfor EU	Ikke samarbei
Andre bedrifter i samme konsern				
Konkurrenter				
Kunder				
Konsulentbedrifter				
Leverandører av utstyr, materiell, komponenter eller dataprogram				

Universiteter og høyskoler				
Offentlige eller private (non-profit) forskningsinstitutter				

DEL II: Spørsmål knyttet til det spesifikke prosjekt:

Prosjektnummer: 137283
Prosjekttittel: Pilestredet Park, Miljøriktig riving, gjenbrukshus og 4D-verktøy

8 Hvilke industrielle resultater har prosjektet resultert i for bedriften (ikke hele prosjektet)?

Vennligst angi antall:

Nye patent-søknader	Lisens-kontrakter	***Nye prototyper***	***Nye produkter /tjenester***	Nye prosesser, metoder, modeller	Virksomheter som utnytter ny teknologi	Nyetableringer

9 Hvilke vitenskapelige resultater har prosjektet resultert i for bedriften?

Vennligst kryss av for hvert punkt:	Ja	Nei	Hvis ja, antall
Dr. grader avlagt			
Vitenskapelige artikler i referee-tidsskrifter			
Rapporter eller artikler i andre faglige tidsskrifter			
Bøker o.l			
Internasjonale konferanser			

10 Hvordan vil du karakterisere de ulike effektene prosjektet har hatt eller forventes å få for bedriften i løpet av de 2-3 første årene etter avslutning av prosjektet?

Kryss av hvis effekten ikke er relevant, om effekten allerede er oppnådd og angi forventning fra 1= liten effekt til 3= stor effekt	Ikke relevant	Allerede oppnådd	Forventes i løpet av 2-3 år: 1	2	3
Styrket konkurranseevne					
Økt produktivitet					
Økt omsetning					
Tilgang på nye markeder					
Økt markedsandel på eksisterende marked					
Forbedret evne til å bruke forskningsbasert kunnskap og teknologi fra universiteter/ høgskoler og forskningsinstitutter og samarbeide med disse					
Forbedret evne til å vurdere, bruke og styre leverandører av konsulenttjenester					
Forbedret evne til å samarbeide med andre leverandører					
Forbedret evne til å samarbeide med konkurrenter					
Styrking av eksisterende kunnskapsbase					

Vennligst fortsett på neste side:

			Forventes i løpet av 2-3 år		
	Ikke relevant	Allerede oppnådd	1	2	3
Ansettelse av medarbeidere med ny spesialkompetanse i virksomheten					
Økt andel FoU-ansatte					
Økt kompetansenivå blant FoU-ansatte					
Utløsning av interne FoU-midler					
Fra kortsiktig til langsiktig FoU					
Større sannsynlighet for utvikling av nye FoU-prosjekter					
Økt evne til praktisk problemløsning					
Dypere forståelse av virksomhetens viktigste (teknologiske) område					
Utforskning av nye, alternative (teknologiske) retninger (technology paths)					

11 Er prosjektet et samarbeidsprosjekt mellom flere bedrifter? Ja ☐ Nei ☐

12 Hvis 'ja', hvor viktig har ulike former for kunnskapsoverføring vært i samarbeidet mellom partene i prosjektet?

Vennligst kryss av for 1=lite viktig til 3=svært viktig	1	2	3	Ikke relevant
Praktisk arbeid				
Utveksling av personell				
Møter/presentasjoner				
Opplæringsprogram eller kurs				
Skriftlig dokumentasjon som rapporter, spesifikasjoner, tekniske tegninger og lignende				
Leveranser av prototyper eller ferdige produktkomponenter				

13 Etter at prosjektet ble avsluttet, har Forskningsrådet hjulpet til å…

Vennligst kryss av for <u>hvert</u> punkt:	Ja	Nei	Vet ikke
….markedsføre resultatene av prosjektet?			
…skape kontakter med andre interessenter?			
…utvikle prosjektet videre?			
…utnytte mulighetene i det øvrige virkemiddelapparatet (f.eks SND, Eksportrådet)?			

Prosjektet er ikke avsluttet ☐

14 Har Forskningsrådet bidratt med veiledning eller annen rådgivning til bedriften?

Kryss av for hver linje, på begge tidsangivelsene	På søknads-tidspunktet			I løpet av prosjekt-perioden			
	Ja	Nei	Vet ikke	Ja	Nei	Vet ikke	Ikke relevant
Prosjektets planlegging/utforming							
Prosjektets tekniske gjennomførbarhet							
Prosjektets ressursmessige gjennomførbarhet							
Muligheter for å beskytte resultater fra prosjektet (f. eks patenteringsmuligheter)							
Prosjektets markedspotensial							
Til å finne relevante samarbeidspartnere i prosjektet							

15 Hvor tilfreds er bedriften med Forskningsrådets hjelp å etablere dialog eller nettverk med eksterne aktører i forbindelse med prosjektet?

Sett ett kryss for hver linje, hvor 1=lite tilfreds og 3= svært tilfreds

	1	2	3	Ikke relevant
Andre bedrifter				
Konsulentbedrifter				
Offentlig sektor				
Forskningsinstitutter				
Universiteter/høyskoler				

16 Hva ville skjedd med prosjektet hvis Forskningsrådet ikke hadde gitt støtte?

Sett kun ett kryss:

Gjennomført prosjektet uten endringer; samme skala og tidsskjema	
Gjennomført prosjektet i samme skala, men på et senere tidspunkt	
Gjennomført prosjektet, men i mer begrenset skala	
Lagt prosjektet på is / ventet	
Henlagt prosjektet	
Vet ikke	

17 Alt tatt i betraktning, hvor passende er følgende beskrivelser som karakteristikk av bedriftens erfaring med Norges forskningsråd?

Kryss av for 1 = svært lite passende til 5 = svært passende	1	2	3
Bedriften er tilfreds med den generelle informasjonen om Forskningsrådets virksomhet, og om programmene			
Behandlingstid var tilfredsstillende			
Prosjektvurdering var tilfredsstillende			
Forskningsrådets krav til økonomisk og faglig rapportering står i forhold til den finansielle bistanden som er gitt			
Forskningsrådets forskningsprioriteringer (f. eks deres programstruktur) er godt tilpasset bedriftens forskningsbehov			
Utbetalinger fra Forskningsrådet er godt tilpasset prosjektets fremdrift			
Vurdering og beslutningsprosess ble gjennomført av Norges forskningsråd på en effektiv og formålstjenlig måte			
Forskningsrådet har bidratt til etablering av viktige nettverk med andre bedrifter eller institusjoner			
Forskningsrådet har bidratt til et grunnlag for framtidig nyskaping, omstilling og konkurranseevne i bedriften			

18 Helt til slutt, hva mener bedriften at Norges forskningsråd bør jobbe mer med for å gi et bedre tilbud til sine kunder?

(fortsett gjerne eget ark)

6.4.3 For institute based contract partners

Til institutter med prosjektfinansiering gjennom Norges forskningsråd

Til institutter med prosjektfinansiering gjennom Norges forskningsråd

'Institutt i dette spørreskjemaet refererer til den gruppe eller avdeling som har vært kontraktspartner i et prosjekt med støtte fra Norges forskningsråd, og som er nevnt ved navn under. Instituttopplysningene som gis skal gjelde for denne enheten, og ikke for det forskningsinstitutt eller universitet enheten eventuelt er del av.

1 Vennligst fyll ut det som mangler om instituttet (gruppen/avdelingen) og rett opp eventuelle feil:

Navn: Universitetet i Oslo
Prosjektleder: Bull, Hans Jacob
Prosjektnummer: 136490
Prosjekttittel: Rett i havn
Organisasjonsnummer:

DEL I: Spørsmål knyttet til samlet virksomhet ved instituttet

2 Vennligst fordel instituttets (dvs. gruppens/avdelingens) prosjektinntekter på ulike oppdragsgivere 2000.

Vennligst angi i %:	År 2000
Norske bedrifter	%
Instituttets (gruppens/avdelingens) egenfinansiering	%
Norges forskningsråd	%
Annen offentlig finansiering (f.eks SND, departementer, kommuner osv.)	%
Norske forskningsinstitusjoner	%
Utenlandske bedrifter	%
Utenlandsk offentlig sektor (ikke EU)	%
EU-finansiering	%
Utenlandske forskningsinstitusjoner	%
Annet	%
TOTALT	100 %

TOTALT (i tusen kroner)	

→ Gi et grovt anslag på hvordan prosjektinntektene fra bedrifter fordeler seg på bedriftsstørrelsene under:

0-49 sysselsatte…….. %

50-249 sysselsatte…….. %

Over 250 sysselsatte…….. %

100 %

3 Vennligst fordel instituttets (gruppens/avdelingens) prosjektinntekter etter viktigste forskningsart i 2000:

Vennligst angi i %:

Grunnforskning (%)	Anvendt forskning (%)	***Teknisk utviklingsarbeid inkludert prototyping (%)***	***Problemløsning, implementering hos bedriftskunder (%)***

4 Hva er instituttets (gruppens/avdelingens) viktigste overleveringsformer av prosjektresultater til ulike brukere?

Sett gjerne flere kryss for hver brukerkategori:	Til bedrifter	Til offentlig sektor
Rapporter eller tilsvarende dokumenter		
Problemløsing hos bruker		
Teknologisk utviklingsarbeid for bruker		
Samarbeid med bruker		
Konsulent-/rådgivingsarbeid		
Seminarer, kurs, opplæring		
Levering av teknologisk 'produkt'		
Testresultater		
Andre former for kunnskapsoverføring		

DEL II: Spørsmål knyttet til det prosjektet som er spesifisert under:

Prosjektnummer: 136490
Prosjekttittel: Rett i havn

5 Vær vennlig å fordele prosjektets ulike finansieringskilder:

	I tusen kroner
Egenfinansiering fra deltakende bedrifter	
Andre norske bedrifter	
Instituttets (gruppens/avdelingens) egenfinansiering	
Andre norske forskningsinstitusjoner	
Norges forskningsråd	
Annen offentlig finansiering (f.eks SND, departementer, kommuner osv.)	
Utenlandske bedrifter	
Utenlandske forskningsinstitusjoner	
Utenlandsk offentlig sektor (ikke EU)	
EU-finansiering	
Annet	
TOTALT	

6 Hvem hadde den avgjørende rollen for initiering, temavalg, utvikling og oppstart av prosjektet? Var denne aktøren også deltaker i prosjektet?

Vennligst kryss av aktørens rolle (ett kryss pr punkt), samt kryss av for aktørens eventuelle deltakelse:

Roller:	En bedrift	Nettverk av bedrifter	***Min forsknings-gruppe/avdeling***	***Andre instituttgrupper***	***Andre aktører (spesifiser!)***	***Deltakelse***	
						Ja	***Nei***
Første initiativ							
Problemstilling, temavalg og målsetting							
Prosjektutvikling og søknad							
Prosjektoppstart, ressursplanlegging							
Totalvurdering av prosjektet							

7 Hvordan vil du karakterisere de ulike effektene prosjektet har hatt eller forventes å få for instituttet (gruppen/avdelingen) i løpet av de 2-3 første årene etter avslutning av prosjektet, og vil du si at Forskningsrådet bidro til oppnåelse av de ulike effektene?

Kryss av hvis oppnådd effekt, og evnt. forventninger om 1= liten effekt til 3= stor effekt og kryss av for NFRs bidrag:	Allerede oppnådd	Forventet effekt i løpet av 2-3 år			Bidrar/bidro NFR til oppnåelse av effekten?		Ikke relevant
		1	2	3	Ja	Nei	
Forbedret evne til å samarbeide med bedrifter							
Bedre forståelse av markedets behov for FoU-basert kunnskap og teknologi							
Styrking av vår eksisterende kunnskapsbase							
Rekruttering av FoU-personale innenfor nye kunnskapsområder							
Større sannsynlighet for utvikling av nye FoU-prosjekter i samarbeid med bedrifter							
Forbedring av instituttets forskningsfaglige nivå og posisjon							
Etablering av samarbeid med nye bedriftskunder							
Utvikling av nye teknologier for eksisterende bedriftskunder							
Utvikling av instituttet mot nye næringsområder							
Utforskning av nye teknologiske retninger (technology paths)							

8 Hvilke bedrifter har deltatt i prosjektet, hvilken næringskategori tilhører disse og hvilken tilknytning har bedriftene hatt til prosjektet?

Fyll ut navn, næringskategori (se rubrikk under) og kryss av for lokalisering og tilknytningsform for hver samarbeidspartner:

		Lokalisering				Tilknytning	
Bedriftens navn:	Nærings-kategori	Norge	Norden for øvrig	EU	Annet	Formell	Uformell

Hvis flere deltakende bedrifter, bruk baksiden av spørreskjemaet!

1.Jordbruk, skogbruk, fiske og fangst **2**.Bergverksdrift **3**.Utvinning av råolje og gass **4**.Næringsmidler og tobakk **5**.Lær og lærvarer **6**.Trevarer **7**.Papirmasse ol. og grafisk **8**.Kull og petroleumsvirksomhet **9**.Kjemikalier og kjemiske prod. **10**.Gummi og plastvarer **11**.Glass og glass prod. **12**.Metaller **13**.Metallvarer **14**.Maskiner og utstyr **15**.Kontor og datamaskiner **16**.Andre elektriske maskiner og app. **17**.Radio-fjernsyn og kommunikasjonsutstyr **18**.Medisinske-, presisjon-, og optiske instr. **19**.Motorkjøretøyer, tilh. og deler **20**.Andre transportmidler **21**. Møbler og annen industriproduksjon **22**.Kraft og vannforsyning **23**.Bygge- og anleggsvirksomhet **24**. Handel- og hotellvirksomhet **25**.Transporttjenester **26**. Kommunikasjonstjenester **27**. Bank, forsikring, andre finansielle tjenester. **28**.Konsulentvirksomhet, IT **29**.FoU, naturvit/teknikk, samf.vitenskap **30**. Annen tjenesteyting. **31**.Undervisning **32**. Helsetjenester

9 Som prosjektleder for et prosjekt med flere samarbeidspartnere, hvordan vil du på vegne av de deltakende bedriftene i prosjektet samlet sett vurdere de ulike effektene prosjektet har hatt eller forventes å få i løpet av de 2-3 første årene etter avslutning av prosjektet?

Kryss av hvis effekten allerede er oppnådd, og evnt. forventninger om 1= liten effekt til 3= stor effekt	Allerede oppnådd	Forventes i løpet av 2-3 år			Ikke relevant
		1	2	3	
Styrket konkurranseevne					
Økt produktivitet					
Økt omsetning					
Tilgang på nye markeder					
Økt markedsandel på eksisterende marked					
Forbedret evne til å bruke forskningsbasert kunnskap og teknologi fra universiteter/ høgskoler og forskningsinstitutter og samarbeide med disse					
Forbedret evne til å vurdere, bruke og styre leverandører av konsulenttjenester					
Forbedret evne til å samarbeide med andre leverandører					
Forbedret evne til å samarbeide med konkurrenter					
Styrking av eksisterende kunnskapsbase					
Ansettelse av medarbeidere med ny spesialkompetanse i virksomheten					
Økt andel FoU-ansatte					
Økt kompetansenivå blant FoU-ansatte					
Utløsning av interne FoU-midler					

Fra kortsiktig til langsiktig FoU					

Vennligst fortsett på neste side:

	Allerede oppnådd	Forventes i løpet av 2-3 år			Ikke relevant
		1	2	3	
Større sannsynlighet for utvikling av nye FoU-prosjekter					
Økt evne til praktisk problemløsning					
Dypere forståelse av virksomhetens viktigste teknologiske område (core technology area)					
Utforskning av nye teknologiske retninger (technology paths)					

10 Hvor viktig har ulike former for kunnskapsoverføring vært i samarbeidet mellom partene i prosjektet?

Vennligst kryss av for 1=lite viktig til 3=svært viktig	1	2	3	Ikke relevant
Praktisk arbeid				
Utveksling av personell				
Møter/presentasjoner				
Opplæringsprogram eller kurs				
Skriftlig dokumentasjon som rapporter, spesifikasjoner, tekniske tegninger og lignende				
Leveranser av prototyper eller ferdige produktkomponenter				

11 Hvilke industrielle resultater har prosjektet som <u>helhet</u> resultert i?

Vennligst angi <u>antall</u>:

Nye patent-søknader	Lisens-kontrakter	***Nye prototyper***	***Nye produkter /tjenester***	Nye prosesser, metoder, modeller	Nyetableringer

12 Hvilke vitenskapelige resultater har prosjektet som <u>helhet</u> resultert i?

Vennligst kryss av for <u>hvert</u> punkt:	Ja	Nei	Hvis ja, antall
Dr. grader avlagt			
Vitenskapelige artikler i referee-tidsskrifter			
Rapporter eller artikler i andre faglige tidsskrifter			
Bøker o.l			
Presentasjon av vitenskapelig arbeid på internasjonale konferanser			

13 Har Forskningsrådet bidratt med veiledning eller annen rådgivning til prosjektet utenom finansiell støtte?

Kryss av for hver linje, på begge tidsangivelsene

	På søknadstidspunktet			I løpet av prosjektperioden			
	Ja	Nei	Vet ikke	Ja	Nei	Vet ikke	Ikke relevant
Prosjektets planlegging/utforming							
Prosjektets tekniske gjennomførbarhet							
Prosjektets ressursmessige gjennomførbarhet							
Muligheter for å beskytte resultater fra prosjektet (f. eks patenteringsmuligheter)							
Prosjektets markedspotensial							
Til å finne relevante samarbeidspartnere i prosjektet							

14 Etter at prosjektet ble avsluttet, har Forskningsrådet hjulpet til å…

Vennligst kryss av for hvert punkt:	Ja	Nei	Vet ikke
…utvikle prosjektet videre?			
…utnytte mulighetene i det øvrige virkemiddelapparatet (f.eks SND, Eksportrådet)?			
…spre de vitenskapelige resultatene fra prosjektet?			

Prosjektet er ikke avsluttet ☐

15 Hvor tilfreds er du som prosjektleder, på vegne av prosjektet som helhet, med Forskningsrådets hjelp til å etablere dialog eller nettverk med eksterne aktører i forbindelse med prosjektet?

Sett ett kryss for hver linje, hvor 1=lite tilfreds og 3= svært tilfreds

	1	2	3	Ikke relevant
Andre bedrifter				
Konsulentbedrifter				
Offentlig sektor				
Forskningsinstitutter				
Universiteter/høyskoler				

16 Hva ville skjedd med prosjektet hvis Forskningsrådet ikke hadde gitt støtte?

Sett kun ett kryss:

Gjennomført prosjektet uten endringer; samme skala og tidsskjema	
Gjennomført prosjektet i samme skala, men på et senere tidspunkt	
Gjennomført prosjektet, men i mer begrenset skala	
Lagt prosjektet på is / ventet	
Henlagt prosjektet	
Vet ikke	

17 Alt tatt i betraktning, hvor passende er følgende beskrivelser som karakteristikk av prosjektets erfaring med Norges forskningsråd?

Kryss av for 1 = svært lite passende til 3 = svært passende	1	2	3
Prosjektet er tilfreds med den generelle informasjonen om Forskningsrådets virksomhet, og om programmene			
Behandlingstid var tilfredsstillende			
Prosjektvurdering var tilfredsstillende			
Forskningsrådets krav til økonomisk og faglig rapportering står i forhold til den finansielle bistanden som er gitt			
Forskningsrådets forskningsprioriteringer (f. eks deres programstruktur) er godt tilpasset de prosjektdeltakende virksomhetenes FoU-behov			
Utbetalinger fra Forskningsrådet er godt tilpasset prosjektets fremdrift			
Vurdering og beslutningsprosess ble gjennomført av Norges Forskningsråd på en effektiv og formålstjenlig måte			
Forskningsrådet har bidratt til etablering av viktige nettverk med andre bedrifter eller institusjoner			
Forskningsrådet har bidratt til et grunnlag for framtidig nyskaping, omstilling og konkurranseevne i de prosjektdeltakende virksomhetene			

18 Helt til slutt, hva mener du på vegne av hele prosjektet at Norges forskningsråd bør jobbe mer med for å gi et bedre tilbud til sine kunder?

(fortsett gjerne på neste side)

Tusen takk for hjelpen! Vær vennlig å returnere spørreskjemaet i vedlagt konvolutt innen 4. mai 2001.

Kontaktpersoner:

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6.5 Litterature

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