Arthur D Little

Pricing and value creation by Landbruks- og matdepartementet's research institutes

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1 Executive summary

Landbruks- og matdepartementet (LMD) has commissioned the Norwegian Research Council to assess five research institutes (primærnæringsinstituttene) in order to strengthen the foundation for an even more robust and internationally competitive institute sector. The assessed institutes are:

- Bioforsk
- Norsk senter for bygdeforskning (Bygdeforskning)
- Norsk institutt for landbruksøkonomisk forskning (NILF)
- Norsk institutt for skog og landskap (Skog og landskap)
- Veterinærinstituttet (VI)

As a part of this assessment, an analysis of value creation and current pricing principles was done with help of Arthur D. Little, a management consulting firm.

This report applies a holistic framework on the institutes' value creation, considering six main value creation aspects or categories:

- Development of human capital
- Business and commercial value
- Effect on policy makers
- Public efficiency gains
- Emergency planning benefits
- Improved quality of life

The value creation analysis in this report is based primarily on fifteen projects, three for each institute, performed during the recent five years, assessed with the above mentioned analysis framework. These projects were selected by the institutes themselves.

The selected projects were used as a basis for discussion in workshops and interviews and as indicators of the value creation across the different categories by the institutes. This sample based, largely qualitative exercise could never claim to scientifically conclude the total value created by the institutes. It would be wrong to extrapolate the value creation estimates from a sample of fifteen projects. Nevertheless, this exercise gave reason for the institutes to define and describe their value creation more than usual.

One of the most important results of this exercise was that the institutes confirmed the viability and relevance of communicating value creation with help of this sort of framework and these value creation categories. Admittedly, the benefits and value for society of research is a scientific discipline in itself. The framework for analysis proposed here is neither unique nor complete. The framework proposed here can certainly be refined if combined with economic research, the five institutes analyzed here are themselves sometimes leaders in this sort of research. Having said this, Arthur D. Little recommends a much more frequent analysis and communication of value creation to all directly and indirectly affected stakeholders, throughout project cycle, from inception through planning, implementation and follow up.

Figure 3 in this report is a discussion based aggregation of the analysis of the five institutes' value creation based on their self assessments, the fifteen project examples and challenged by Arthur D. Little having done a number of external stakeholder interviews.

Illustrative, indicative, unscientific combination of interview results, self assessments, aggregation of 15 sample projects

	Development of human capital	Business and commercial value	Effect on policy making	Public efficiency gain	Emergency planning benefits	Quality of life
Bioforsk	High	High	Medium	Low	Low	Medium
Bygdeforskning	High	Low	Medium	Low	Low	Medium
NILF	Medium	Medium	Medium	High	Low	Low
Skog & Landskap	Medium	Medium	High	High	Low	Low
VI	High	Low	High	Medium	High	Medium

Value creation: High, Medium, Low

Figure 3: Discussion and interview based estimate of value creation per institute, referring to interview based, not scientifically valid estimates of value creation

There is a correlation between the share of funds allocated to the different roles of the institutes and their value creation in categories particularly relevant for those roles:

- There is a correlation between the funds allocated for public administration support (forvaltningsstøtte) and the value creation in terms of effect on policy making, public efficiency gain and emergency planning benefits
- There is also a correlation between the share of funding allocated for research and value creation in terms of development of human capital
- There is a correlation between private funding and commercial value creation. The institute with the highest share of private funding (Bioforsk) also has the highest estimated value creation in terms of business and commercial impact The other four institutes have a low share of private funding and less commercial value creation

The institutes are currently charging more or less on "cost plus" basis, i.e., full cost per hour, including overhead costs. Some of the institutes are adding a small "profit" as a buffer for unexpected events or less billable time than budgeted.

The pricing of a project (research or public administration support) is based on the cost of man hours based on the institute's hourly rates and direct project costs. Few exceptions from this principle appear. Skog og landskap does, however, have two price lists, one for public administration support assignments and another for research. The prices for research are higher to cover added costs for non-billable time spent on fundraising for research projects.

The institutes use the same basic principles for calculating their hourly rates. The income from the billable man hours is supposed to generate enough revenue to cover all indirect costs. Billable hours are those hours spent on activities that are in line with, and supported by, the institutes' research or public administration support assignments. Some of the larger categories of indirect costs which the billable hours are supposed to cover include:

- Administrative staff
- Facilities
- Institute management
- Non-billable time for researchers (e.g. time spent for fundraising)

The share of overhead varies between the institutes mainly as a result of the share of non-billable hours. Non-budgeted activities do not exist per se, except for budget deficits. However, more or less unwanted activities occur and the costs are "hidden" in the overhead, which increases the institutes' hourly rates.

Projects that need more hours than budgeted to be acceptably completed sometimes generate a budget deficit. The deficit is covered with projects running with a profit, or in the end with the institute's basic funding.

To increase the competitive robustness of the institutes and to assure high value creation, Arthur D. Little proposes the following:

- Insist on high beneficiary (client) participation in all activities because this is generally a value creation enhancer. High beneficiary or "customer" involvement is necessary for staying aligned with the knowledge needs in society and industry in particular. This is relevant for applied research rather than basic research.
- Research at the institutes should be part of innovation networks with many players, insisting on high "customer" involvement, financially and operationally secures this. Again, this
- Insist on analyzing and communicating value creation along the whole project cycle, from inception through planning, implementation and follow up
- Introduce strategic planning to continuously determine the portfolio of focus areas per institute. This strategic planning should consider the value creation dimension together with the institutes' competitive position and the future attractiveness of each knowledge area
- The Research Council (Forskningsrådet) has a clear mandate to facilitate, drive and communicate the above mentioned, recommended, value creation communication and strategic planning. The research Council should use its mandate even more for this
- The current cost based rather than value based pricing principles are good and should be maintained, always including overhead costs in the hourly rates. This is a way of enabling knowledge transfer to multiple stakeholders with a fair and full cost coverage, ensuring as little distortion of competition as possible

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2 Background

The Research Council of Norway (Norges Forskningsråd) is responsible for increasing the knowledge base and promoting basic and applied research as well as innovation. The Research Council has the mandate to give the government advice related to research, distribute research grants (some 6.2 billion NOK in total) and create arenas for meetings and network building.

Not only shall the Research Council identify research needs, set priorities and administer the financing, it is also responsible for following-up and evaluating both input (resources and costs) and output (value of produced research).

Landbruks- og matdepartementet (LMD), one of the financing government bodies, has asked the Research Council to undertake an extensive assessment of five research institutes (primærnæringsinstituttene) for which LMD is responsible. The assessed institutes are:

- Bioforsk
- Norsk senter for bygdeforskning (Bygdeforskning)
- Norsk institutt for landbruksøkonomisk forskning (NILF)
- Norsk institutt for skog og landskap (Skog og landskap)
- Veterinærinstituttet (VI)

The main objective of the assessment is to create a foundation for a more robust institute sector by identifying means to:

- Develop an effective institute sector with high quality, good judgment, and high international competitiveness
- Improve the processes and the division of work between the institutes and their public stakeholders in terms of the support activities the institutes conduct for the public sector

As a part of this overall assessment, an analysis of the performance of the above research institutes in terms of *value creation* was undertaken in combination with an assessment of current *pricing* principles. This assignment was performed by Arthur D. Little with important involvement from the Research Council and the institutes. This report concerns that value creation and pricing assessment.

2.1 Objectives and scope

The objective of this report is to enable the Research Council and the research institutes to better estimate and explain their value creation for clients and society at large. The report also tries to put value creation into an adequate context and introduce a framework for strategic planning, which is one of the most important applications of the value creation framework proposed here in order to better enable future prioritizations of what to do.

This report is a result of the following activities driven by Arthur D. Little together with the institutes and their stakeholders:

- Defining criteria for value creation
- Identifying projects conducted in the last five years by the institutes that exemplify value creation

- Quantifying and assessing the value generated by the identified projects
- Interviewing a selected number of clients and external stakeholders to obtain their view on created value of the selected projects
- Documenting pricing principles of assignments for Norwegian, international public and private sector
- Documenting cost calculations used for pricing of assignments
- Identifying potential ongoing improvement initiatives for pricing
- Identifying how non-budgeted activities are financed
- Recommending principles for future prioritization and pricing of projects to maximize value creation for the institutes' customers

2.2 Methodology

This assessment is based primarily on interviews, questionnaires distributed to project managers, workshops and institute accountings. We conducted 31 interviews with research project managers and institute management and a number of external stakeholders (a number of external stakeholder interviews are still pending and will influence the final version of this report). In addition we organized a workshop with 15 participants from the institutes. For a detailed list of interviewees and workshop participants, see appendix.

Some of the questions in the assignment behind this report look for some sort of deviations from management or stakeholders directives, i.e., if reality is different from the official accounted for common view, not shown in the accountings. This means that it is obviously difficult to support some of the findings with data, hence interviews become an important input to the analysis. I.e., the assignment is partly about looking for real life practices that are not evident in documented accounting. In search of this sort of findings, Arthur D. Little has used interviews. In order not to stigmatize interviewees, Arthur D. Little does not reveal who said what.

3 Definition of value creation

Value creation is a central concept in the management and organization literature for both micro and macro level research. Yet there is little consensus on what value creation is or how it can be achieved.[1]

In the light of the above statement, the term value creation (verdiskapning) will in this report be defined as benefits derived from the activities performed by the institutes. This includes benefits for the Norwegian public sector (with lead users such as LMD, Mattilsynet, Fylkesmannen, etc.), the private sector (with lead users such as farmers, food producers, forest industry, etc.), the research community and also the society at large.

In addition to their research role, the institutes have a supportive role to the public sector (forvaltningsstøtte). It is important to look at value creation not only from an innovation and commercial perspective, or from an academic perspective for that matter. This report applies a more holistic view on value creation including the mentioned innovation, commercial and academic perspectives.

It is important to differentiate between two components of value creation: the value potential and the realized value. Generating potential is value creation of its own, but it is not until someone (such as the lead user) implements and utilizes the knowledge that it becomes really beneficial to the public sector, private sector, the research community or the society at large.

3.1 A framework for analyzing value creation

Based on our own and others' experiences in research institute sectors and in collaboration with the five institutes, Arthur D. little has developed a framework which aims at capturing the most important aspects of the value creation of the institutes.

The framework specifies six categories of value creation, generated either by research activities or public administration support activities ("*forvaltningsstøtte"*). The categories included in the framework are:

- *Development of human capital*

  Acquisition of new knowledge and contribution to dissemination of knowledge within the organization, to the research community, the public sector, the industry and the general public

- *Business and commercial value*

  Absorption of generated knowledge by companies or spin-offs for commercial purposes and the exploitation of generated intellectual property (e.g. patents)

- *Effect on policy makers*

  Indirect or direct influence on policy makers locally, regionally, nationally and internationally

[1] Kepak, David; Value creation and value capture – A multilevel perspective; *Academy of Management Review* 2007: (32) 180–194

- *Public efficiency gains*

  Contribution to cost-effectiveness or quality improvement of public administration

- *Emergency planning benefits*

  Contribution to risk assessment, risk reduction, impact limitation, creation and execution of action plans in the event of unwanted situations

- *Improved quality of life*

  Improvements for the general public which includes a broad range of benefits, e.g. healthier people, less environmental effects, biological diversity, gender equality and vivid rural areas

There are an infinite number of criteria or sub-categories within each category. Figure 1 illustrates some important criteria for each category; however the list is not exhaustive, and is not meant to be, as some criteria will be more important for specific financiers/lead users than others.

Development of human capital	Business and commercial value	Effect on policy making	Public efficiency gain	Emergency planning benefits	Quality of life
■ Publication – Scientific journals – Popular scientific dissemination ■ PhD involvement and teaching aspects ■ Migration of knowledgeable researchers to – Industry – Public administration – Other institutes – Internationally ■ Seminars ■ Etc.	■ IPR generation ■ Spin-off companies ■ Cost saving for companies ■ Product improvements ■ Company networking ■ Risk reduction (e.g. contamination risk) for food producers ■ Etc.	■ Impact on laws and directives ■ Impact on budget process ■ Impact on the political debate ■ Etc.	■ Cost reduction of public administration ■ Improved public processes ■ Etc.	■ Reduction of the risk for an unwanted event to occur ■ Reduction of economical impact such an event ■ Reduction of environmental impact of such an event ■ Etc.	■ Improved environment ■ Improved gender equality ■ Improved situation for rural communities ■ Sense of food safety ■ Etc.

Source: Arthur D. Little analysis

Figure 1: Main categories of value creation including examples of important criteria or sub-categories

3.2 Measuring value creation

By expanding the definition of value creation from innovation and commercial value, wider than academic criteria, absolute measurement of value creation will only partially be possible. The purpose of evaluating value creation will thus guide the measurement ambitions. If the purpose is to distribute funding based on value creation, then at least a relative measurement is needed; if the purpose is to communicate value, then descriptive, qualitative measures may be sufficient.

The purpose of this evaluation of value creation is three-folded:

- Illustrate and communicate value created by the institutes

- Create a footprint of the current state regarding value creation vis-à-vis current and recent funding
- Introduce a framework for prioritization and pricing of research and services

The first two above mentioned purposes can to some extent be performed by using just descriptive, qualitative measures. To effectively communicate to all stakeholders however, quantification of the value is often necessary, preferably in monetary units.

In this framework, the value creation should be quantified and translated into monetary units whenever possible, but qualitative descriptions remain important and necessary. Figure 2 illustrates a non-exhaustive list of examples of measurement parameters.

Examples

	Measurement of value creation (examples)	
	Descriptive	**Quantitative**
Development of human capital	■ What human capital was created? Is it unique? ■ Did anyone continue into a company or another research institute? ■ Was there any teaching involved? – Any PhDs? – Any seminars held? ■ Was there any publications? (Popular science / peer reviewed journals) ■ Was any partners (industry/research) involved?	■ How many were part of the team? ■ Number of publications / citation? ■ Income from publications? ■ Did anyone get a salary increase?
Business and commercial value	■ Did the research result in any intellectual properties? – Patents? – Databases? ■ Did it result in products? ■ Could production be improved? ■ Did any other forms of innovations come out: – Service, prduct or process innovations? ■ Creation of a spin-off company? ■ Could consultation in the topic be sold?	■ How much did productivity improve? – Cost saving? ■ For how much have the products been sold? ■ How much investment has the spin-off raised? ■ What was the value of the licensing deal?
Effect on policy making	■ Was there a change in policies as a result of the project? (Governmental, fylke or kommune) – Laws & regulations? – Budgets? – Recommendation? ■ Has the result affected the political debate?	■ What economic impact did the policy change have?
Public efficiency gain	■ Did the project improve public administration? – Faster? – Less resources? – Reduce unnecessary tasks? ■ Higher accuracy of measurements and diagnostics?	■ Cost savings by the public? – Money – Man hours – Other resources
Emergency planning benefits	■ What unwanted event could the project prevent/minimize? ■ How did the project contribute to lowering the risk?	■ How much would the worst case cost be of the unwanted event? – Has it happened in other countries? – What was their cost? – What is the worst case scenario you could imagine that this project could help avoid? ■ How much did the project contribute to minimizing the risk?
Quality of life	■ Did the project have any effect on the environment? – How? ■ Did the project have any effect on the Norwegian culture? – How?	■ What economic impact did it have? – What would people or society be willing to pay for such an increase in quality of life? (e.g., creatively / hypothetically compare land prices before and after, what is it worth in the eyes of the people who enjoy it, etc.)

Figure 2: Examples of qualitative and quantitative measurement parameters

Qualitative and relative rather than absolute quantitative value creation estimates are more or less the only reasonable ambition for many of the projects discussed in this report. Nevertheless, Arthur D. Little has tried to be as specific as possible and has challenged institutes' self assessments by combining global industry benchmarks, interviews and workshops with institute management and project managers.

3.3 Future applicability of the framework at the institutes

The framework for value creation assessment has been probed and utilized by fifteen project managers at the institutes.

Project leaders found this framework useful and most of them appreciated that it captures a wider perspective than just quantifiable monetary values. The framework gave a structured approach to thinking about value creation. The project leaders believe that the framework can help them in communicating value creation in fundraising applications.

The framework can also be a useful tool in the institutes' strategic work. The framework should be analyzed together with the institutes' competitiveness in a particular focus area, both nationally and internationally while also considering the long term importance of that focus area. This strategic prioritization, which is an important application of the value creation assessment, is further discussed in Chapter 7.

4 Value created by the institutes

Fifteen projects, three for each institute, were selected as samples and assessed with the above mentioned framework. The selection aimed at assessing the institutes' value creation, but also to probe the defined framework, and to refine it for future use. The fifteen projects ere selected by the institutes themselves.

Arthur D. Little would like to emphasize that this interview- and discussion based exercise is not scientifically valid but indicative.

4.1 Institutes' value creation footprint

The selected projects were used as a basis for discussion in workshops and interviews and as indicators of the value creation across the different categories by the institutes. This sample based exercise could never claim to scientifically conclude the total value created by the institutes. It would be wrong to extrapolate the value creation estimates from the sample of fifteen projects. Nevertheless, this is a pragmatic and eye opening exercise which illustrates how value creation can be estimated. Rather than being an absolute scientificly valid result, this exercise proved that the proposed framework for value creation is viable and useful.

Illustrative, indicative, unscientific combination of interview results, self assessments, aggregation of 15 sample projects

	Development of human capital	Business and commercial value	Effect on policy making	Public efficiency gain	Emergency planning benefits	Quality of life
Bioforsk	High	High	Medium	Low	Low	Medium
Bygdeforskning	High	Low	Medium	Low	Low	Medium
NILF	Medium	Medium	Medium	High	Low	Low
Skog & Landskap	Medium	Medium	High	High	Low	Low
VI	High	Low	High	Medium	High	Medium

Value creation: High, Medium, Low

Figure 3: Indicative interview based estimate of value creation per institute, referring to interview based, not scientifically valid estimates of value creation

The result of this exercise illustrates the current status of value creation and serves as a starting point for discussion within the institutes and with financiers and beneficiaries or "customers". The result should be seen in relation with the funding the institutes receive.

Examples of analysis that can be performed are illustrated in figure 4-6. The funding for public administration support and research as well as funds for commercially related projects are compared with the value creation categories that are relevant to the different stakeholders. This analysis shows correlation between the share of funds allocated to the different roles of the institutes and their value creation in categories particularly relevant for those roles:

- There is a correlation between the funds allocated for public administration support and the value creation in terms of effect on policy making, public efficiency gain and emergency planning benefits
- There is also a correlation between the share of funding allocated for research and value creation in terms of development of human capital
- There is a correlation between private funding and commercial value creation. The institute with the highest share of private funding (Bioforsk) also has the highest estimated value creation in terms of business and commercial impact The other four institutes have a low share of private funding and less commercial value creation

Public admin support

	Effect on policy making	Public efficiency gain	Emergency planning benefits	Share of funding for public administration support
Bioforsk	Medium	Low	Low	46%
Bygdeforskning	Medium	Low	Low	10%
NILF	Medium	High	Low	52%
Skog & Landskap	High	High	Low	57%
VI	High	Medium	High	65%

Note: Public administration support means activities performed either by funding stipulated in the assignment letter or by other funding for assignments perform for public administration (e.g. assessments and diagnostics)

Value creation: High, Medium, Low

Figure 4: Share of funds for public administration support (forskningsstøtte) compared with administration support related value creation categories, referring to interview based, not scientifically valid estimates of value creation

Among the assessed institutes, Veterinærinstituttet has the highest share of funds for public administration support. This is also met by a high value creation in public administration related categories shown in figure 4. The opposite is shown for Bygdeforskning, which in the absence of an assignment letter is more research focused and hence shows less value creation in the above exemplified categories.

Research

	Business and commercial value	Effect on policy making	Development of human capital	Share of funding for research
Bioforsk	High	Medium	High	50%
Bygdeforskning	Low	Medium	High	88%
NILF	Medium	Medium	Medium	46%
Skog & Landskap	Medium	High	Medium	37%
VI	Low	High	High	35%

Note: Research means research activities performed by funding from the Research Council, private companies, EU and other national and international organizations and excluding funding for assignments for public administration (even if some of these assignments are research)

Value creation: High, Medium, Low

Figure 5: Share of research fund compared with research related value creation categories, referring to interview based, not scientifically valid estimates of value creation

For example, Bygdeforskning creates more of its value in research oriented categories, in particular in creation of human capital. However, it is difficult to quantitatively, in any absolute terms, compare the different institutes on the above exemplified value creation categories.

Commercial value creation and share of funding from private companies is shown in figure 6. Arhur D. Little has defined private funding more narrowly than NIFU-STEP and excluded post such as NFR fondsmidler and NFR jordbruksavtalemidler which explains a lower share in this reporting.

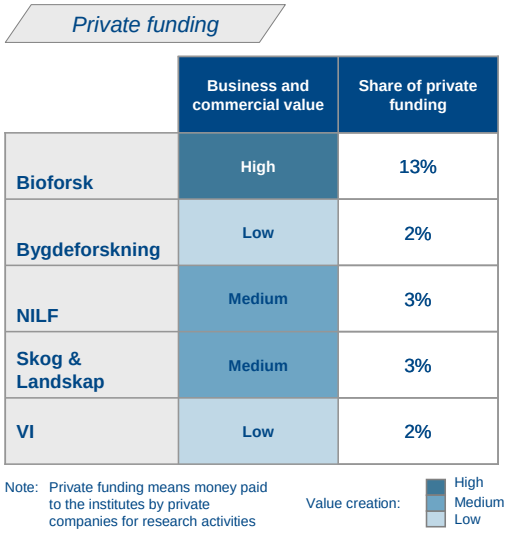


Figure 6: Share of private funding compared to commercial and business value creation, referring to interview based, not scientifically valid estimates of value creation

Only Bioforsk is assessed to have high commercial value creation, and Bioforsk is also the institute with the highest share of industry related funds.

VI's assessment estimates that VI does not deliver as much of value to the industry. This can be explained by two reasons: For one, VI considers administrative support as its core activity and business related value creation becomes a secondary activity. Secondly, the institute contributes to high food safety in Norway, but this is a result of high regulatory demands placed on the food producers, hence the perceived value for the industry is indirect and difficult to attribute to VI's services. On the contrary, the food industry may sometimes consider itself negatively affected in terms of additional costs for food safety rather than benefiting from the high Norwegian standards. VI is instrumental in maintaining those high standards. Food safety is an important aspect of Norwegian quality of life. This example illustrates the complexity of assessing the value created by the institutes.

4.2 Summary of selected projects

Each institute was asked to select three projects, preferably with different beneficiaries and financiers. The project manager for each selected project was given an explanation of the value creation framework and was asked to self-assess the value creation of the project. Figure 7 is an aggregated summary of the selected projects' perceived value creation and impact. Arthur D. Little then discussed and challenged that self assessment in interviews and workshops.

	Development of human capital	Business and commercial value	Effect on policy making	Public efficiency gain	Emergency planning benefits	Quality of life
The selected projects	Medium impact	Medium impact Identified generated value of ~30 mNOK + potential of >100 mNOK	High impact Identified generated value: 200 mNOK	Medium impact Identified generated value of 3 mNOK + potential of >300 mNOK	Medium impact	Medium impact
	■ Medium impact on PhD involvement ■ Medium impact on salaries of affected knowledge generators ■ Low impact on teaching ■ Medium impact on people migration ■ High impact on publication and seminars	■ High impact on cost saving for companies ■ Medium impact on IPR generation ■ Medium impact on product improvements ■ Medium impact on company networking ■ High impact on risk reduction for food producers	■ High impact on laws and directives ■ High impact on budget process ■ Medium impact on the political debate	■ Medium impact on cost reduction ■ High imact on improved processes	■ Medium impact on risk reduction	■ Medium impact on environment ■ Low impact on gender equality ■ Medium impact on rural communities ■ High impact on food safety

The summary of the value creation is very approximate and un-scientific; nevertheless, the summary gives a good indication of strengths and development areas and can be a useful footprint for future strategy work

Figure 7: Summary of the aggregated value created by the selected fifteen projects

The supporting role the institutes have for the Norwegian public sector is reflected in the value created by these projects. Aggregating the findings from the fifteen projects clearly indicates that the institutes have had high impact on policy making. Several Norwegian government directives seem to stem from the projects, influencing the national budgets.

The projects have had a medium impact on the industry. Only a few examples have given clear economic benefits for the private sector. Examples include intellectual property rights, product improvements and cost reduction. However, even though several projects have had business related value as the primary or secondary objective, concrete and realized values are rare.

Most projects have had development of human capital as either a primary or secondary value creation objective. A lot of knowledge seems to have been generated, however, the institutes could probably aim for even more PhD involvement, teaching, networking with and/or migration of knowledgeable researchers to the industry, public administration or the international research community, etc.

4.3 Bioforsk

The primary areas for value creation for Bioforsk are human capital and business value, with main beneficiaries being LMD, Mattilsynet and food producers. Other policy making bodies, including Klima- og forurensningsdirektoratet (KLIF), Direktoratet for naturforvaltning (DN), Statens landbruksforvaltning (SLF) and Miljøverndepartementet (MD) are also important beneficiaries.

Figure 8 summarizes the three projects assessed in collaboration with Bioforsk. The main objectives of these projects have been commercial aspects, development of human capital and support to policy makers.

Institute & Project manager	Project name	Primary value creation	Secondary value creation
Bioforsk Jihong Liu Clarke	Genetic engineering for cost effective, environmentally - and health-friendly production of poinsettia	■ Commercial value *(potential)* – Patent application ("Transformation of poinsettia plants") – Potential license value of 100 mNOK annually – Reduced use of growth retardants corresponding to a saving of 5 mNOK annually in Norway, confirmed by industry stakeholders ■ Human capital – 1 PhD, 1 master student, 2 postdocs and several others involved – Salary increases – Migration of 1 postdoc to China – 7 publications (incl. international journals, popular science publications, etc.) – 6 talks at international symposiums	■ Policy making – Positively influencing the GMO debate ■ Quality of life – More environmentally friendly growth of poinsettia
Bioforsk Trygve Aamlid	Evaluation of turfgrass species and varieties for use on Scandinavian golf courses	■ Commercial value *(potential)* – No delay (through less damaged grass) in opening of golf courses in Scandinavia after winter season – 200 mNOK in extra labor and renovation costs (soil, fertilizer, etc.), confirmed by industry stakeholders – 300-500 tNOK in lost fees p.a	■ Human capital – PhD involvement – Salary increase ■ Policy making – Prohibition in Norway of the use of introduced and un-adapted plant material for revegetation
Bioforsk Bernt Hoel	Balanced fertilization	■ Policy making – Recommendations for P-fertilization of grain, forage and potato has been reduced by approximately 30% – Knowledge generated central in reporting in accordance with and fulfilment of Nordsjøavtalen and Vannrammedirektivet ■ Human capital – ~10 people involved – International and national publications of scientific and popular science articles – Published handbook for fertilization – Seminars	■ Commercial – Product improvement of fertilizer by Yara International ASA – Increased production

Figure 8: Summary of Bioforsk's selected projects

4.4 Bygdeforskning

Bydgeforskning's main value creation is human capital which is benefiting the research community, both nationally and internationally. Other beneficiaries are local and national policy makers, farmers, forest owners and other local enterprises. (Figure 9)

Bygdeforskning

	Development of human capital	Business and commercial value	Effect on policy making	Public efficiency gain	Emergency planning benefits	Quality of life
Primary beneficiaries	■ Other researchers – nationally – internationally ■ International research institutes ■ Research community	■ Farmers and forest owners ■ New local farm enterprises ■ Small & medium businesses ■ Regional and national commercial organizations	■ LMD ■ KRD (Kommunal- og regionaldepartementet) ■ SLF ■ DN ■ Politicians and political parties ■ Fylkesmannen ■ Fylkeskommune and kommune			■ Rural development ■ Kommune ■ Local businesses ■ Farmers ■ Welfare organizations
Focus of value creation	**High**	**Low**	**Medium**	**Low**	**Low**	**Medium**

Figure 9: Summary of Bygdeforskning's beneficiaries

Figure 10 summarizes the three projects assessed in collaboration with Bygdeforskning. The main objectives of these projects have been development of human capital and effects on policy makers.

Institute	Project name	Primary value creation	Secondary value creation
Bygde-forskning Gunn-Turid Kvam	Expansion Strategies for Local Food Enterprises	■ Human capital – 3 postdocs involved – 5 publications (National and international journal, books and seminar papers) – 4 local seminars – TV-interviews and chronicles in newspapers	■ Commercial value – Idea sharing regarding strategic approaches amongst local enterprises ■ Policy making & Public efficiency – Improvement of local support to entrepreneurs ■ Quality of life – Promotion of local food – Increase in women entrepreneurs (gender equality)
Bygde-forskning Katrina Rønningen	Building scenarios as a tool for dialogue, business development and management in protected coastal areas	■ Policy making – Regional county and Ministry of Environment change regulations and licenses due to this research	■ Human capital – Four institutes in Norway involved with more than 10 researchers – International collaboration with Sweden and Switzerland ■ Quality of life – Maintain rural settlement and the transportation system that serves the area (boat transportation) which makes the area accessible both for holiday home owners and locals
Bygde-forskning Magnar Forbord	Analyzing supply chains for bio energy and factors for development in different regions	■ Human capital – 6 postdocs involved – 3 seminaries held – Publications include 1 chronicle in national paper and 1 CRR report – 1 planned article in an international journal	

Figure 10: Summary of Bygdeforskning's selected projects

4.5 NILF

Public efficiency gain is NILF's primary value creation category together with effect on policy makers, business and commercial value and development of human capital. The main beneficiaries are LMD, SLF, Finansdepartementet (FIN), the research community, farmers and food producers. (Figure 11)

NILF

	Development of human capital	Business and commercial value	Effect on policy making	Public efficiency gain	Emergency planning benefits	Quality of life
Primary beneficiaries	■ Research community ■ Public administration ■ Industry associations (Farmer union etc.)	■ Farmers ■ Food producers ■ Aquaculture	■ LMD ■ FIN (Finans-departementet) ■ Fylkesmann ■ Innovasjon Norge ■ NHO	■ LMD ■ SLF ■ Mattilsynet ■ Innovasjon Norge ■ Fylkesmannen		
Focus of value creation	**Medium**	**Medium**	**Medium**	**High**	**Low**	**Low**

Figure 11: Summary of NILF's beneficiaries

Figure 12 summarizes the three NILF projects assessed. The main objectives of these projects have been improved efficiency of public administration and effect on policy makers.

Institute	Project name	Primary value creation	Secondary value creation
NILF Ivar Pettersen	Evaluation of the rural development support	■ Public efficiency *(potential)* – Labor reduction, 1 mNOK annually	■ Human capital – 5 persons involved, non PhDs – Chronicle in national paper ■ Quality of life – Increased vitality at farms, in rural communities
NILF Klaus Mittenzwei	Jordmod - Agricultural sector modeling	■ Policy making – Enlightening the public discussion on agricultural policy matters ■ Other – Jordmod provides research infrastructure that is most useful for other research activities at NILF – The competence of the Jordmod team at NILF has facilitated several research projects funded by NFR. These research projects would not have been possible without the human capital developed through Jordmod – NILF performs tasks on behalf of the Ministry of Agriculture and Food (LMD) at conferences and official meetings at the OECD. Without human capital developed through Jordmod, these activities would not have been possible	■ Human capital – Unique modeling skills with respect to Norwegian agriculture – Numerous seminars at NILF and at Ministries between 1994 and 2005. Clients often view the process as being more valuable than the numerical results – Numerous media reports, popular-scientific publications, NILF-reports and chronicles based on model results
NILF Erland Kjesbu *The project's degree of completion is being verified*	E-based exchange of economic data and improved decision support	■ Public efficiency *(potential)* – Faster, more effective, less double registration and paper-handling – Estimated savings of 2 mNOK annually – With broader participation from the government, saving potential of 300 mNOK – Improved data quality in order to improve decision support	■ Human capital – Substantial increase in competence, assume the project manager could raise his salary by more than 50 percent – Three participants from NILF, five from the industry – Two seminars so far, many presentations to the industry ■ Commercial values – Standards generated are IPR protected (IP exploitation possible, potential of 2-3 mNOK annually) – Potential of exporting infrastructure to industry – Potential consultancy services

Figure 12: Summary of NILF's selected projects

4.6 Skog og landskap

The public sector is the main beneficiary of Skog og landskap's activities. The lead users include LMD, MD, SLF, and Miljøforvaltningen. Business and commercial benefits are mainly enjoyed by farmers and foresters. (Figure 13)

Skog og Landskap

	Development of human capital	Business and commercial value	Effect on policy making	Public efficiency gain	Emergency planning benefits	Quality of life
Primary beneficiaries	■ Employees ■ Other researchers ■ Other research institutes ■ The public	■ Commercial agriculture and forestry ■ Forest industry ■ Consumers	■ Offesiell politikk (LMD, MD, KD) ■ Interesse politikk (næring eller ideell)	■ SLF ■ Miljø-forvaltningen ■ The public ■ Other public organizations	■ Skogsforvaltning ■ Forest owners ■ SLF	■ KLIF and other environmental organizations ■The public
Focus of value creation	**Medium**	**Medium**	**High**	**High**	**Low**	**Low**

Figure 13: Summary of Skog og landskap's beneficiaries, Public administration is all levels National, Regional and Local in different sectors

Figure 14 summarizes the three projects assessed in collaboration with Skog og landskap. The main objectives of these projects have been increased public efficiency, commercial value and effect on policy makers.

Institute	Project name	Primary value creation	Secondary value creation
Skog & Landskap Ingrid Tenge	Development of land resources and property maps on the Internet	■ Public efficiency – Fulfilled response to the National Audit Office demand for improved documentation regarding subsidy payments – Improved accuracy for subsidy payment – Reduced labor for control of subsidy payment	■ Human capital – 4 people involved, 2 national articles, several national seminars – Competence development in 300 communes, , for some 40 own employees and some 40 000 farmers having adopted new technology, 20-30 Fylkesmenn officials have also started to use the developed solutions ■ Commercial value – Improved accuracy in subsidy payments (i.e. either positive or negative effect on the individual farmer) – Reduced cost for surveying
Skog & Landskap Andreas Treu	Wood protection by means of modification with furfuryl alcohol	■ Commercial value – Contributed to patent applications – Spin off of Kebony ASA, a company manufacturing wood with improvements in durability and dimensional stability – Recently raised €12m in capital – Turnover 27,5 mNOK in 2009	■ Human capital – 6 postdocs, 2 PhDs and one master student involved – 3 of them have migrated to industry – 10 international and 2 national publications the last 2 years ■ Policy making – Restriction on the use of copper chromium based wood preservatives in Norway
Skog & Landskap Birger Vennesland	Forest resources – Strategies for increased felling	■ Policy making – Improved incentives for reinvestments in forest land – Increased budget (+ ~500 mNOK) for forest infrastructure	■ Commercial value – Improved cultivation of forest land – High indirect commercial value as the project's conclusions make the Norwegian forest industry much more open to increased logging ■ Human capital – 5 people involved – One moved on to public administration – Salary increase

Figure 14: Summary of Skog og landskap's selected projects

4.7 VI

The public sector is the main beneficiary of VI's activities, with lead users such as Mattilsynet, and various ministries. (Figure 15)

Veterinærinstituttet

	Development of human capital	Business and commercial value	Effect on policy making	Public efficiency gain	Emergency planning benefits	Quality of life
Primary beneficiaries	■ VI ■ Research community ■ Mattilsynet ■ Departements ■ Health services ■ The public ■ Industries	■ Industries – Fish and animals – Food	■ Mattilsynet ■ LMD ■ FKD (Fiskeri- og kyst-departementet) ■ HOD (Helse- og omsorgs-departementet) ■ MD ■ International policy makers	■ Mattilsynet ■ LMD/ FKD	■ Mattilsynet ■ LMD, FKD og HOD ■ Health services ■ Food, fish and animal industries	■ The public
Focus of value creation	**High**	**Low**	**High**	**Medium**	**High**	**Medium**

Figure 15: Summary of VI's beneficiaries

Figure 16 summarizes the three projects assessed in collaboration with VI. The main objectives of these projects have been development of human capital, commercial value, effect on policy makers and emergency planning.

Institute	Project name	Primary value creation	Secondary value creation
Veterinær-instituttet Live Nesse	Salmonella in factories	■ Human capital – 1 PhD who turned postdoc and 1 technician involved and 1 senior research scientist involved – Several publications (incl. international journals, popular science publications etc.) – Talks at international symposiums ■ Commercial value – Reduced risk for contamination of feedingstuffs	■ Quality of life – Sense of safety when eating egg and chicken and other animal products ■ Emergency planning benefits – Risk reduction of salmonella contaminated feedingstuffs
Veterinær-instituttet Merete Hofshagen	Action plan for *Campylobacter* species in chicken	■ Policy making – Adaptation of action plan by Mattilsynet – Requirement of heating or cooling of contaminated chicken – Reduced risk for society, reduced healthcare costs	■ Human capital – 1 postdoc and 2 PhDs involved – International networking – International publications and national popular science publications ■ Commercial value – Improved bio-security and less contaminations – Although increased cost for freezing and heating of contaminated chickens ■ Quality of life – Sense of safety when eating egg and chicken
Veterinær-instituttet Tormod Mørk	Surveillance, monitoring, control and fighting of Bluetongue	■ Policy making – Training of Mattilsynet regarding Bluetongue – Recommendation not to vaccinate livestock – Total savings around 100-200 mNOK ■ Emergency planning – Reduced the risk for contamination through surveillance, monitoring, control and selective avert emergency slaughtering	■ Human capital – 10-15 people involved – National publications – Seminaries ■ Commercial value *(potential)* – Avert emergency slaughtering of livestock

Figure 16: Summary of VI's selected projects

5 Pricing

Pricing of activities (services) and products can be based on either cost or value. Figure 17 illustrates different ways of charging for a service, with cost oriented pricing in the base of the pyramid and more value oriented pricing at the top.

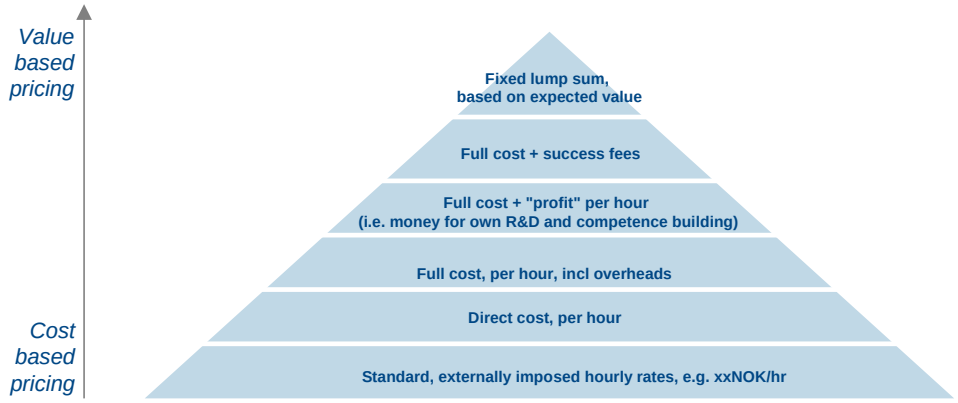


Figure 17: Generic illustration of pricing – Cost oriented vs. value oriented pricing

The value based pricing at the top of the pyramid represents a principle which basically corresponds to the calculated value-add (the estimated value creation) the service will give the client. However, in a competitive market, that price will always be hard to charge. Relative deregulation is another prerequisite necessary for value based pricing to prevail. Most of us recognize situations when, for some reason, competition is limited and pricing is deregulated. In such situations, pricing can be close to the maximum value perceived by the buyer. In highly competitive deregulated markets, prices instead tend to approach the seller's cost of production.

This assessment documents the institutes' current pricing principles and it addresses if opportunities exist to move towards a more value based pricing.

5.1 Current pricing of projects

The institutes are currently charging more or less in accordance with step 3 in the above pyramid, full cost per hour, including overhead costs. Depending on the definition of overheads, one could argue that the institutes are charging in accordance with step 4, full cost + profit (i.e. money for own R&D and competence building). Some of the institutes are adding a small "profit" as a buffer for unexpected events or less billable time than budgeted.

The institutes have different price categories corresponding to different levels of expertise (or age group), hence different salary levels. Figure 18 shows Bioforsk's hourly rates as an example.

Bioforsk

Category type	Category	Price per hour (NOK)
Junior researchers	1	790
Researchers	2	860
Senior researchers	3	930
Senior researchers/management	4	990
Senior researchers/management	5	1020
Senior management	6	1050
Technical/administrative staff	7	870

Figure 18: Bioforsk's hourly rates in NOK

The pricing of a project (research or administrative support) is based on the cost of man hours based on the institute's hourly rates and direct project costs. Few exceptions from above principles were noticed. Skog og landskap does, however, have two price lists, one for administrative support assignments and another for research. The prices for research are higher to cover added costs for non-billable time spent on fundraising for research projects.

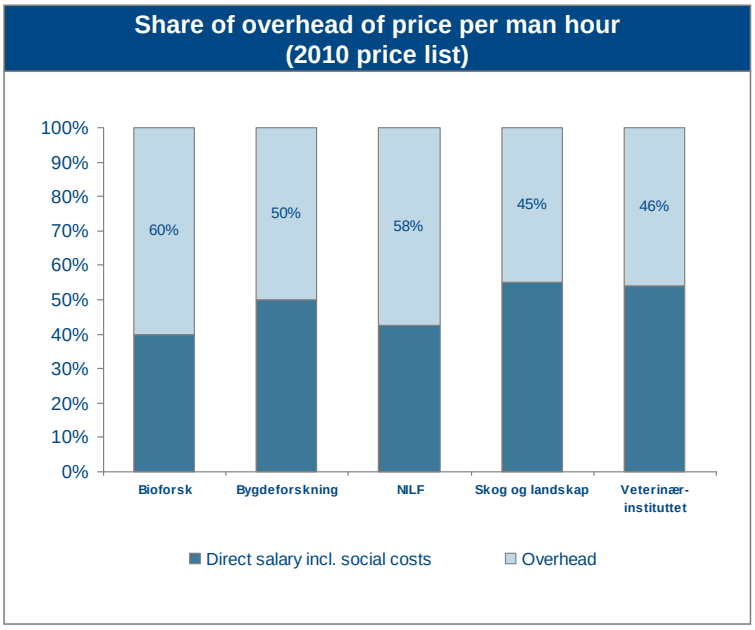
Income from intellectual property rights is limited for the institutes. Some income exists from publications and software but nothing from patents. Pricing mechanisms to earn revenues from intellectual property (e.g., royalties) is perhaps the most realistic, but nevertheless challenging, way of adding value based pricing to the generally cost based pricing these institutes are constrained to. This will be further discussed in Chapter 7.

5.2 Cost calculation of hourly rates

The institutes use the same basic principles for calculating their hourly rates. The income from the billable man hours is supposed to generate enough revenue to cover all indirect costs. Billable hours are those hours spent on activities that are in line with and supported by the institutes' research or public administration support assignments. Some of the larger categories of indirect costs which the billable hours are supposed to cover include:

- Administrative staff
- Facilities
- Institute management
- Non-billable time for researchers (e.g. time spent for fundraising)

The overhead varies between the institutes. Figure 19 summarizes the split of direct salary and the added overhead for the institutes. Arthur D. Little has used the same calculation method and definition of overhead on all institutes to make the numbers comparable.



Source: Institute price list calculations, Institute budgets, Arthur D. Little analysis
Note: Overhead is defined as all costs not directly allocated to a billable project (e.g. administration and management of staff, facility costs, depreciation, non-billable time)

Figure 19: List price split between direct salary costs and overhead

The share of overhead varies between the institutes mostly as a result of the share of non-billable hours. The institutes use different methods to calculate billable hours in their price list calculations. Some institutes set individual billability targets per employee while others use the institute's outcome from previous year. Further, VI has not classified fundraising activities as non-billable time, but instead uses its basic funding to pay for these activities.

Arthur D. Little has no reason to conclude that the current overhead cost levels are inadequately high. Instead, the main issue is that current accounting makes it difficult to identify what sort of opportunities for productivity improvements there are. This is why Arthur D. Little recommends overhead accounting to be more broken down to smaller pieces so that the institutes can measure-analyze-act on productivity improvement opportunities.

5.3 Current pricing improvements programs

No improvement programs for pricing are currently undertaken by any of the assessed institutes.

5.4 Reflections on current pricing principles

The description of current pricing leads Arthur D. Little to conclude that this is a good practice which should be maintained. It is important that the institutes with part of their funding being public and fixed, do not disturb competition in the market. Cost based pricing is the only viable principle. Having said that, it is important that the cost based prices include overhead costs such as "selling" (i.e., fund raising) and research. This way, the institutes do what they can in order not to compete with subsidized prices.

6 Financing of non-budgeted activities

Non-budgeted activities do not exist per se, except for budget deficits. However, more or less unwanted activities occur and the costs are “hidden” in the overhead, which increases the institutes’ hourly rates.

6.1 Project budget deficit

It happens that projects need more hours than budgeted to be acceptably completed. This sometimes generates a budget deficit. The deficit is covered with projects running with a profit, or in the end with the institute’s basic funding.

Depending on institute and individual researchers, other ways of completing projects without generating a deficit exist:

- Charge other projects (research or administrative support) with better budgets
- Work on spare time (weekends and evenings without registering the time spent)
- Do research on administrative time (non-billable time)

To minimize the risk of deficits, regular reviewing is performed between the section leader and the project manger.

6.2 “Hidden” indirect costs

“Hidden” unwanted activities include, for example, pro bono activities/seminars, social activities, excessive bureaucracy.

7 Recommendations

Arthur D. Little proposes the following recommendations:

7.1 Proposal for principles for prioritization of research and services

The five research institutes list their respective sets of focus knowledge areas, (kjernekompetanser) in their self assessments (egenvurderinger) written in 2010. To a large extent these lists have gradually been defined by historic incremental changes in roles and responsibilities of different institutes vis à vis each other, rather than by strategic analysis for each institute determining its competitive strengths vis à vis its Norwegian and global competition.

To increase the competitive robustness of the institutes and to assure high value creation, Arthur D. Little proposes the following:

- Introduce strategic planning to continuously determine the portfolio of focus areas per institute
- Insist on high beneficiary (client) participation in all activities because this is generally a value creation enhancer

7.1.1 Introduce strategic planning

To continuously enhance competitiveness and robustness of each institute, strategic planning should consider three main factors for each knowledge/service/focus area:

- *The future importance of a given area*

  This factor should reflect to what extent the knowledge area is growing in importance or if it is declining. (Is there an increasing need in the future to understand the area? How will the available funding for this area develop in the future?)

- *The institute's competitive position in this area*

  This factor should reflect how strong the institute is in executing the service/research in the respective knowledge area. (Is the institute national leader in the area? Is the institute international leader in the area? Is the area highly competitive?)

- *The estimated value creation in the area*

  This factor should reflect the value creation from executing research/services in the knowledge area, based on the above introduced value creation framework. (What is the value creation potential? How much of the potential can realistically be realized?)

In practice, this strategic planning means to determine what areas to invest in and what areas to divest in or stay away from. It also determines in what areas an institute is strong by itself and in what areas an institute would benefit from partnering, build alliances, merge or even acquire assets. Figure 20 and 21 illustrate this strategic planning framework. However, before assessing the knowledge areas, it is important to do a thorough segmentation of knowledge/service/focus areas beforehand to make sure the institute captures all current activities and all relevant future potential areas.

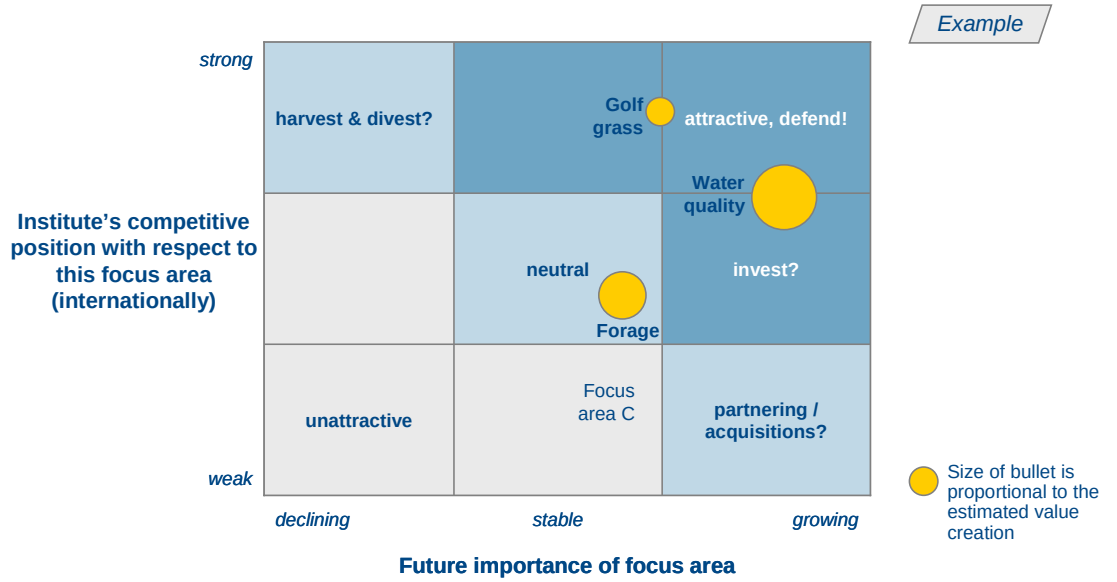


Figure 20: Illustration of strategic planning framework, with a very limited selection of focus areas. The exercise should include the whole universe of activities and knowledge areas in order to give a meaningful result

Connected to above framework, spend/investment need per area is also introduced to give an understanding of what the cost is or what the cost would be to achieve competitiveness in each area.

The Research Council (Forskningsrådet) has a clear mandate to facilitate, drive and communicate the above mentioned, recommended, value creation communication and strategic planning. The Research Council should use its mandate even more for this.

To the potential discussion about merging different institutes, Arthur D. Little would like to say, without having a mandate to recommend anything on this, that the above mentioned strategic planning should be a logical and rational basis for that discussion. The strategic logic for partnerships/alliances/mergers should be found in the complementarity of institutes' competitive positioning, ability to create value and the needs for them in society.

7.1.2 Insist on high "customer" or beneficiary participation

For the strategic planning described above to be adequate and based on relevant assumptions about the future, it is crucial to have a high degree of beneficiary involvement, from either the industry or the public sector. Earlier in this report we have elaborated on different ways of determining value creation. The beneficiary perspective is important in order to determine the value of each area of activities, at least when it comes to some of the value creation criteria such as business and commercial value, effect on policy making and public efficiency gain. An extensive survey of research and technology institutes performed by Arthur D. Little in 2009, concluded that institutes operating with less customer involvement tended to operate more like universities where research interests of staff dominate over serving industries or national interests.

A way to achieve beneficiary participation, the institutes should clarify and communicate more to all stakeholders, both public sector and private sector stakeholders, the strategies, objectives and value creation ambitions of the institutes. This is a way of recognizing the highly interactive network and “eco-system” based approach necessary for increasing innovation with help of these institutes.

There is a difference between basic research and applied research in the sense that basic research addresses the questions nobody knew how to ask before, hence basic research is not able to identify its customers the way applied research is. “Customer” involvement is therefore relevant most of all for applied research.

7.1.3 Incentivize the institutes more towards value creation

As discussed earlier in this report, the value creation of the institutes is partly realized value but largely potential value, to be created later. This report also elaborates on how important it is to describe the intended value creation of projects, knowledge areas, etc. Project managers who have participated in this assessment have confirmed the importance of trying to describe as much as possible the intended and analyzed value creation of activities. As so much of the value is potential and unrealized, there may not be any immediate receipt from the market confirming value. In the light of this, institutes should insist more on assessing value along pre-defined criteria throughout the project cycle, from project inception to follow up. Concretely this means that a table with the value creation potential, including the value creation categories proposed in this report, should be maintained and updated along the whole project cycle. This value creation tracking should be communicated to stakeholders along the project cycle. This practice will stimulate project managers and stakeholders to challenge the value creation at all times.

Focusing more on communicating value creation will enable the institute sector to be more output oriented as opposed to input oriented. The institute sector currently reports its activities much referring to the input resources. This needs to continue but value creation analysis is a way to focus on the output results.

7.2 Proposal for future pricing

The institutes’ current cost based pricing seems to be the only valid way of charging for the services as most of the activities are directly or indirectly funded with public money. Even if most of the funding for a project is obtained from the industry, most likely some funds are also received from the Research Council, which limits value based pricing. Still, improvements for pricing exist and Arthur D. Little proposes the following:

- Split and specify the administration component which is currently such a big part of the overhead
- Improve the potential for revenues from intellectual properties (IP)
- Use best practice for all institutes for the cost calculation of price list including same definition for overhead and non-billable time

7.2.1 Creating revenues from IP is challenging

Some of the institutes' work imply that they potentially enable valuable intellectual property to be created somewhere in society. There are a number of challenges the institutes need to be aware of and address to make IP exploitation successful:

- Only few institutes make any money doing this. The key is to make sure the research is commercially relevant
- Problems around IP ownership. Involved parties need to be transparent about this and agree up front
- The institutes need flexibility to be able to negotiate a favorable deal
- Raising awareness in industry that the institutes have IP to offer
- Making academics interested in the third mission of commercialization (the other two missions being teaching and publications in good quality journals)

Above all, cost based pricing, without any IP or other value creation based pricing, is the most simple and transparent way to finance institutes without disturbing competition in the market.

7.2.2 Improved cost based calculation for price list

The basic principles for the current cost calculations are good. However, the institutes are not using the same methods of calculation. To increase the ministries' and the Research Council's confidence in the institutes' pricing, Arthur D. Little recommends that all assessed institutes use the same method and make this method well documented and communicated to the stakeholders.

Most of the institutes have good practices in their calculations which in a dialogue between the institutes and financing stakeholder should be decided between to derive at a best practice.

Arthur D. Little recommends that overhead cost due to non-billable time is based on individual targets rather then previous year's outcome. By doing so, the institutes are given an instrument to incentivize increased billability and in the long run reduce overhead cost.

8 Appendix

8.1 List of documentation used in this assessment

In addition to excerpts from the institutes accounting systems and time recording systems, the following documentation categories have been used as sources for this report:

- Assignment letters (tildelningsbrev)
- Institute constitutions (vedtekter)
- Strategy documents
- Annual reports
- Descriptions of current pricing structures
- Institute self-assessments (Egenvurderinger)
- NIFU-STEP reporting
- Value creation and value capture – A multilevel perspective; Academy of Management Review 2007: (32) 180–194
- The new partnership between research & technology institutes and industry, Arthur D. Little, Prism 2010: (1) 39-49
- Review of supports for exploitation of Intellectual Property from Higher Education Research, Arthur D. Little report

8.2 List of interviewees

Name	Institution	Position / Role
Ivar Ekanger	LMD	Involved in Skog & landskap projects
Eiliv Sandberg	Fylkesmannen Hedmark	Involved in Bygdeforsk projects
Johan Chr. Mørkved	Fylkesmannen i Nord Trøndelag	Involved in Bygdeforsk projects
Hege Hopen	Norgesfôr	Involved in VI projects
Maria Strandberg	Svenska Golfförbundet	Involved in Bioforsk projects
Bjornar Bjelland	G3 Ungplanter	Involved in Bioforsk projects
Harald Lossius	BioForsk	Director
Terje Granli	BioForsk	Admin director
Nils Vagstad	BioForsk	Research director
Johong Liu Clarke	BioForsk	Project manager
Trygve Aamlid	BioForsk	Project manager
Bernt Hoel	BioForsk	Project manager
Egil Petter Stræte	Bygdeforskning	Director
Linn Heidi Vinje	Bygdeforskning	Office manager
Marit S. Haugen	Bygdeforskning	Research manager
Katrina Rønningen	Bygdeforskning	Project manager
Gunn-Turid Kvam	Bygdeforskning	Project manager
Magnar Forbord	Bygdeforskning	Project manager
Ivar Petersen	NILF	Director
Klaus Mittenzwei	NILF	Project manager
Arne Bardalen	Skog & landskap	Director
Nina Brøgger	Skog & landskap	Organization director
Idun Thorvaldsen	Skog & landskap	Controller
Hildegunn Norheim	Skog & landskap	Department director
Dan Aamlid?	Skog & landskap	Department director
Geir-Harald Strand?	Skog & landskap	Department director
Østein Dale	Skog & landskap	Department director
Andreas Treu	Skog & landskap	Project manager
Ingrid Tenge	Skog & landskap	Project manager
Birger Vennesland	Skog & landskap	Project manager
Harald Gjein	VI	Admin director
Janneche Utne Skåre	VI	Research director
Nina Grøttan	VI	Admin director
Frode Granås	VI	Controller
Tormod Mørk	VI	Project manager
Live Nesse	VI	Project manager
Merete Hofshagen	VI	Project manager

Figure 21: List of interviewees

8.3 Workshop participants

Name	Institution	Position
Harald Lossius	BioForsk	Director
Terje Granli	BioForsk	Admin director
Johong Liu Clarke	BioForsk	Project manager
Egil Petter Stræte	Bygdeforskning	Director
Magnar Forbord	Bygdeforskning	Project manager
Ivar Petersen	NILF	Director
Klaus Mittenzwei	NILF	Project manager
Hildegunn Norheim	Skog & landskap	Department director
Østein Dale	Skog & landskap	Department director
Andreas Treu	Skog & landskap	Project manager
Ingrid Tenge	Skog & landskap	Project manager
Harald Gjein	VI	Admin director
Janneche Utne Skåre	VI	Research director
Tormod Mørk	VI	Project manager
Live Nesse	VI	Project manager

Figure 22: Workshop participants