

*Fostering growth in the Blue Economy by developing
an action plan for Innovative European Aquaculture
VET and harmonized qualifications*

BlueEDU aquaculture industry results from Mid-Norway

Group interviews with managers that lead 520 staff in the fish farming industry

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Summary

BlueEDU is an Erasmus Plus Sector Skills Alliance LOT 1 Project (2016-2018), which aims at fostering growth in the Blue Economy by developing an action plan for Innovative European Aquaculture VET and harmonized qualifications. A demonstration action, in combination with a group interview and a survey, were developed to evaluate the opinions of managers leading 520 workers in fish farming industry in Mid-Norway.

NTNU and the Guri Kunna aquaculture VET school have collected and gathered information from a representative group of regional managers within the aquaculture industry in Mid-Norway. The purpose was to investigate and document the situation regarding workforce qualifications and skills and their influence on recruitment issues.

This report summarizes the opinion survey results based up on the analysis of data gathered during 5 meetings with 3 large and one medium sized fish farming company. Each meeting was at maximum 60 minutes long. The data were collected by applying the one2act EVAL tool and targeted both farming and processing managers. The goal was to collect data that had a high response rate, but without spending too many hours on collecting the data. By investing up to 5 hours with work (one hour per meeting), it was possible to collect data and feedback from 100% of the group for more than 40 questions. The results are presented in 34 graphs (figures) that are grouped together in five main areas:

- Area 1. Company basic information
- Area 2. The company's competence composition
- Area 3. The company's recruitment needs
- Area 4. The company's future need for new competence
- Area 5. Conditions: locally - nationally - internationally

Within area 2, our results show that the managers consider skills like work quality, business orientation, proactivity, collaboration and independence to be more important than learning (figure 2). This shows that aquaculture VET programs are important, but still not at the top of the list of work force skills that the fish farming industry must deal with on a daily basis.

Within area 3, our results help identifying key challenges for rural areas in the costal zone, though this type of data is not directly linked to how to organize aquaculture VET courses. Our results show that there is a significant shortage of workforce within the aquaculture industry today. This is a consequence of the fast expansion in the aquaculture industry during the recent years, whereby it has been necessary to recruit many more people to work in the fish-farming sector. Indeed, capacity building must support modern aquaculture VET programs in order to catch up and provide aquaculture qualifications to those who lack them. Our data shows that lack of access to aquaculture VET courses is considered to be a relatively small challenge by the fish farming companies today. Skills based up on own work experiences is still supposed to be important during the next upcoming years in the fish farming industry, though this

may change fast due to technological developments and grow of industry that require a higher degree of specialization of the work force.

During the next five years the Guri Kunna aquaculture VET school is expected to educate 200 persons that have got national recognized qualifications within aquaculture. During the same period 109 people will retire from the fish farming industry, 53 within processing and 56 within farming. It take 4 years to educate a person with appropriate aquaculture qualifications, whereby there will be lag in the public educational system when the industry grows fast.

50% of the managers don't know what will be the potential consequences of unmet need for skills in their company. 1 out of 5 company managers' replies that the shortage of employees with aquaculture qualifications will hinder or reduce the expansion of the production and processing capacities in their company.

Within area 4, the managers report that 53% of the aquaculture industry applies the apprenticeship system as their most important strategy for recruitment of a workforce that has got their aquaculture qualifications. 1 out of 3 companies (34%) prefer to outsource work operations as their second most important strategy. This is even more important than raising the competence of their employees (29%) such that they get documented aquaculture qualifications, or hiring new employees (27%).

To recruit new staff through the apprenticeship system is considered to be an easy and safe operation. Outsourcing is today a well-known strategy within the farming companies, which prefer to specialize on increasing their production of farmed salmon and trout. They apply it on many work operations, whereby it seems to be applicable as their second most important "recruitment strategy", when they lack personnel with qualifications.

To raise the competence of their staff through aquaculture VET programs is the third most important strategy for recruitment of personnel with aquaculture qualifications. The importance of this strategy is at the same level as hiring new personnel.

The two most important types of vocational education and training programs are aquaculture, which is part of the "agriculture, fishing and forestry" program (selected by 66% of the managers), and the "technical and industrial production" program selected by 49% of the managers.

For short time training activities, are internal courses and training an important mean of increasing the competence of the workforce as selected by over half of the managers. Experienced staff will support and train the staff that has less experience.

VET courses offered to industry that leads to national recognized qualifications, have a strong position in the industry market in Norway. More than 75% of the managers report that their companies to a large degree support long-term training leading to a national recognized journeyman certificate. It provides a wide scope of basic set of skills on which companies can rely for a broad range of their working activities. Candidates that have got this journeyman aquaculture certificate may work in several types of work operations and activities within the fish farms, making them attractive for companies where the activities to some extent follow the season.

1 out of 3 companies make up arrangement at the company level such that their staff may take a journeyman certificate when they are in full job. The rest of the companies claim that they do it to some degree. The companies want their staff to study to a journeyman certificate as an integrated part of their job.

75% of the managers report that courses addressing “Technical subjects with a continuous applied and integrated practice” are the most important ones. This reflects the needs in an industry characterized by fast technological developments. This is followed by courses leading to a “management, organization and cultural understanding” as the second most important area, selected by 46% of the managers, reflecting that the industry has become an international actor. 34% of the managers report that the digital skills of the employees should be enhanced, which is consistent with the number of managers indicating that digital skills are important (section 2.7.). The reason is that ICT is applied to control and operate a lot of the fish farming equipment and operations. 27% of the managers mention that language training is important. The working language inside the companies is Norwegian, whereby the foreign staff needs to get trained to speak and read that language.

Our results shows that the fish farming industry is much stronger on carrying out applied research tasks compared to setting up long term research programs involving PhD students from universities. 48% of the companies mention that they collaborate with other fish farming companies in order to carry out developments, despite that they are competitors on the same market when selling their fish.

Thus, the in company development in fish farming industry in Mid-Norway is driven by strong collaboration between companies and the research environment. The companies choose to collaborate with each other even though they are competing on the same market when selling their products. In addition they support the aquaculture VET schools by offering students access to practice and training involving modern equipment.

Within area 5, there is an overwhelming agreement that both each company and the fish farming industry sector will be influenced by external changes during the next 3 to 5 years. Our data shows that that the managers perceive that the company will be influenced by new technology to a larger extent than the fish farming industry itself. However, they perceive the opposite with respect to new legislation and regulations. That is, a smaller number of managers believe that legislation is a factor of change in company than the industry.

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Method

In this study the Guri Kunna VET schools conducted group interviews and collected data from 41 managers that lead 520 staff in the aquaculture industry. In the fish farming companies respondents were site managers, while in the processing companies they were production line managers.

There are five main areas targeted by the questions in the study:

- Area 1. Company basic information
- Area 2. The company's competence composition
- Area 3. The company's recruitment needs
- Area 4. The company's future need for new competence
- Area 5. Conditions: locally - nationally - internationally

The following companies have participated in the survey: Salmar, Lerøy Midt, Måsøval Fiskeoppdrett and Marine Harvest.

Collecting basic information about the companies has been attempted by sending an e-form by email to senior executives for the fish farming company (area 1). Unfortunately, to collect this information with this method did not work for the fish farming companies as the response rate become too low.

In the other four main areas (number 2 to number 5), the data has been gathered by using one2act Eval¹, an immediate response system, which has been developed by Norwegian University of Science and Technology (NTNU)

In "conventional" surveys, it is common for questions to be sent asked via email or phone. Other methods include one to one interviews and online survey systems such as Lime Survey², SurveyMonkey³, QuestBack⁴ or other similar systems.

The background to our methodology is that none of these methods are hassle-free in terms of efficiency, participation and "accuracy" in the surveys, and here are several issues one should note:

- There is no guarantee that relevant subjects will be reached using the usual methodology for such investigations.
- The relevant subjects might not answer.
- An online survey may potentially reach a large number of respondents, but experience shows that it requires a lot of motivational activity and marketing to get a sufficient number of responses.

In our survey, we have collaborated with the largest actors in the Mind-Norway region. We have selected to combine group interviews together with immediate response technology in order to mitigate several of the shortcomings of the other methods. These group interviews are conducted at one of the

¹ www.one2act.no

² www.limesurvey.org

³ www.surveymonkey.com

⁴ www.questback.com

company's regular meeting arenas and the target group has been middle managers in the companies that then respond to the survey based on their knowledge of competence among their subordinates. Central to our method is that we conduct dialogue with the group before and immediately after the answer itself. Each group interview including the collection of data, lasted up to 60 minutes. Our theory is that one will then have a greater opportunity to uncover and correct misunderstandings and differences in interpretation of the questions. It may also be that the answers to the questions reveal the need for additional questions, and this is also possible with this method.

One2act EVAL System

One2act EVAL is a quick evaluation system that uses respondents' own internet enabled devices (smartphones, tablets, laptops and other standard web browsing capable devices) to respond to surveys and evaluation questionnaires. The system was designed to be used in educational settings but it is quite generic and the application scope is much larger. In a typical scenario, the presenter uses EVAL teacher client to define the questions, control various aspects of the response collection and to access the results while the respondents use a web app to connect to the service and reply to the answers posed by the teacher. In the current version there are three types of supported questions: multiple choice questions which may or may not have a specified correct answer, rating or Likert questions with scales from two to seven alternatives and open text questions.

Each evaluation or survey questionnaire gets a session code upon uploading onto the server. The session code is used to allow the students to easily connect to the set of questions desired.

The answers are immediately aggregated making possible instant feedback and discussion based on the responses. Thus the presenter can dismiss misunderstandings and misconceptions very early on one hand and on the other she can adapt the discussion according to the feedback from the respondents.

Depending on the situation it is possible to run a re-vote on several questions or ask additional ad-hoc questions.

EVAL is part of one2act response technology services. At the core of the system there is a server that hosts the central database and provides the interfaces suitable for specific use-cases. The server communicates with the clients using REST interfaces.

In Figure 1 are depicted screenshots from the user interfaces of both the teacher and the student clients of the EVAL system.

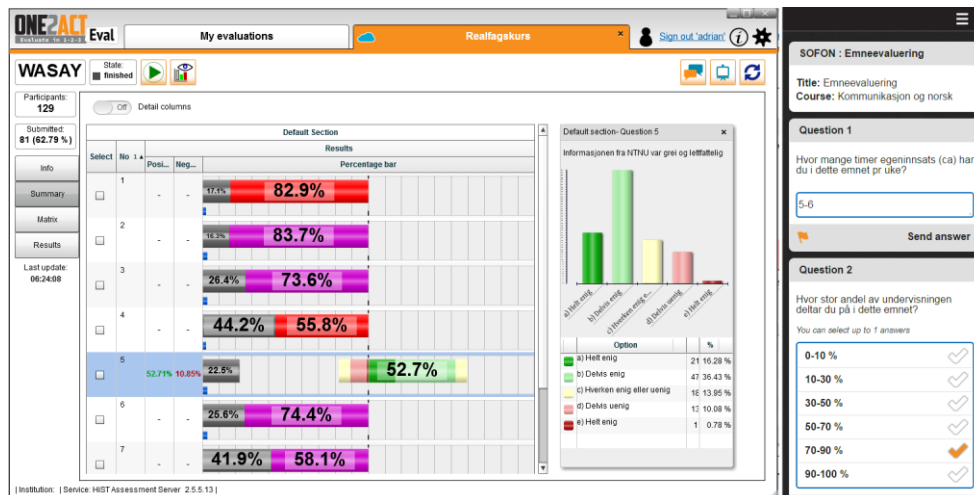


Figure 1: Eval user interfaces: teacher client (left) and student client (right)

One2act EVAL teacher client

The presenter can use the EVAL software to create, control and monitor sessions. Each session has associated a set of questions that can be of various types.

EVAL teacher client is an application developed in Flex and ActionScript and it runs on the Adobe Air runtime. The application provides several perspectives that are suitable for the typical tasks of the user.

Among the perspectives provided by the user interface there are:

- Session management perspective – allows the user to manage and control multiple sessions
- Editor perspective – allows the creation and uploading of the questionnaires
- Monitoring perspective – allows the teacher to see the results as soon as they are sent by the students
- Presenter perspective – facilitates discussion with the students about the results through visualizations that are suitable to be displayed to all participants.

The one2act student client

The student client is a web app written in HTML and JavaScript that communicates via Ajax with the REST API provided by the server. The one2act student client is compatible with all modern browsers that consistently make use of current web standards.

Using the one2act web app, the respondents can join sessions that were prepared by the presenter and respond to the questions. If the presenter allows it, they can choose to participate anonymously.

Area 2: The Company's Competence Composition

The second area of questioning dealt with the company competence profile and the skills of the workforce.

The set of questions refers to 20 skills and they have been grouped in 8 categories:

- 2.1. Work quality
- 2.2. Business orientation
- 2.3. Proactivity
- 2.4. Collaboration
- 2.5. Independence
- 2.6. Learning
- 2.7. Digital literacy
- 2.8. Communication

The managers were required to indicate how important a skill was for employees and managers using the following scale: to a small degree, to some degree, to a large degree, I don't know, not relevant. Figure 2 shows the results aggregated in categories and ordered by the degree of importance.

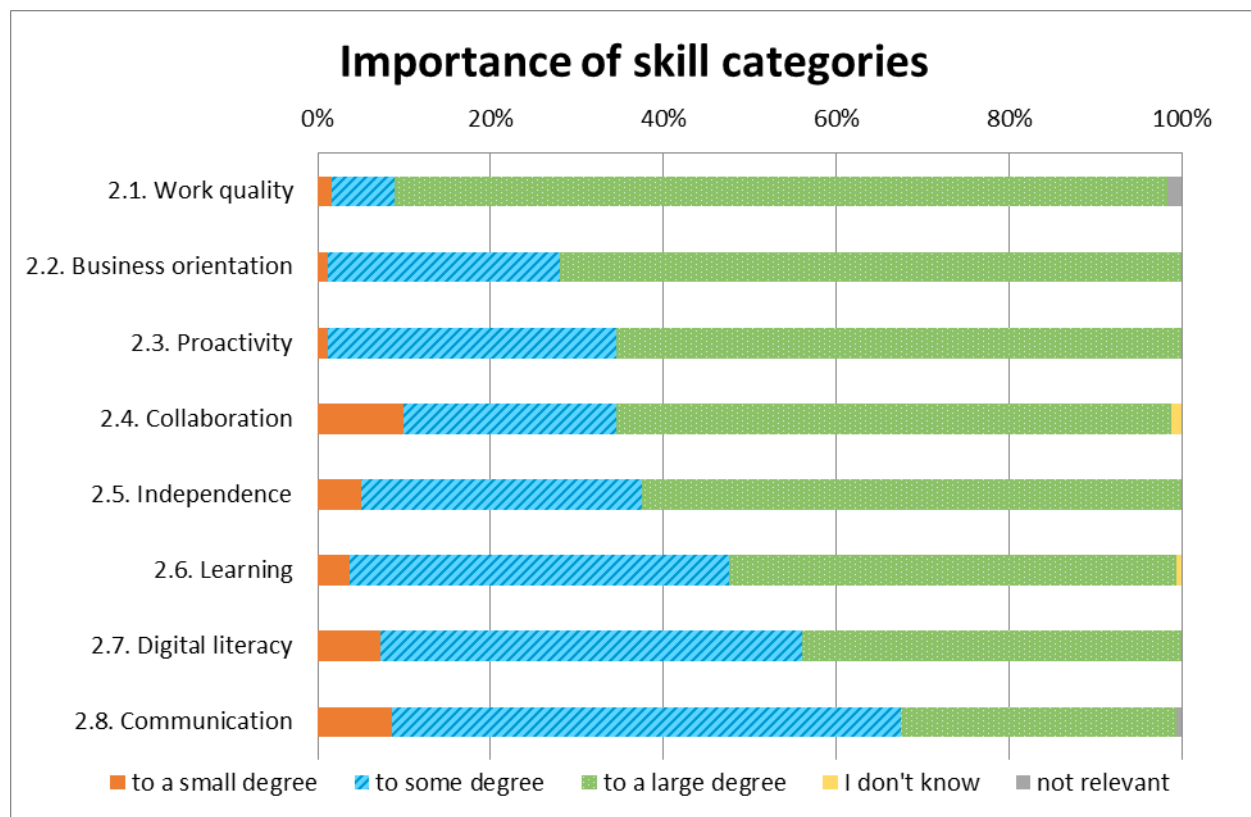


Figure 2: Importance of skill categories

The top most important categories are “work quality” (2.1.) and “business orientation” (2.2.). Almost 90% of the managers consider skills in the “work quality” category very important and over 70% of them

consider skills in “business orientation” category to be very important. Over 60 % of the managers consider skills in the categories “proactivity” (2.3.), “collaboration” (2.4.) and “independence” (2.5.) to be important,

These answers indicate that the employees and managers need to be very well prepared and knowledgeable of their craft. Moreover they need to be able to work both independently and in collaboration with others and they must be able to take initiative and be proactive. The reason is that the fish farming industry is challenged by new problems that must be solved on a daily basis.

2.1. Work quality

In the “work quality” category were included the following statements:

- 2.1.1. know well the actual craftsmanship
- 2.1.2. can work safely (avoid accidents)
- 2.1.3. has professional pride

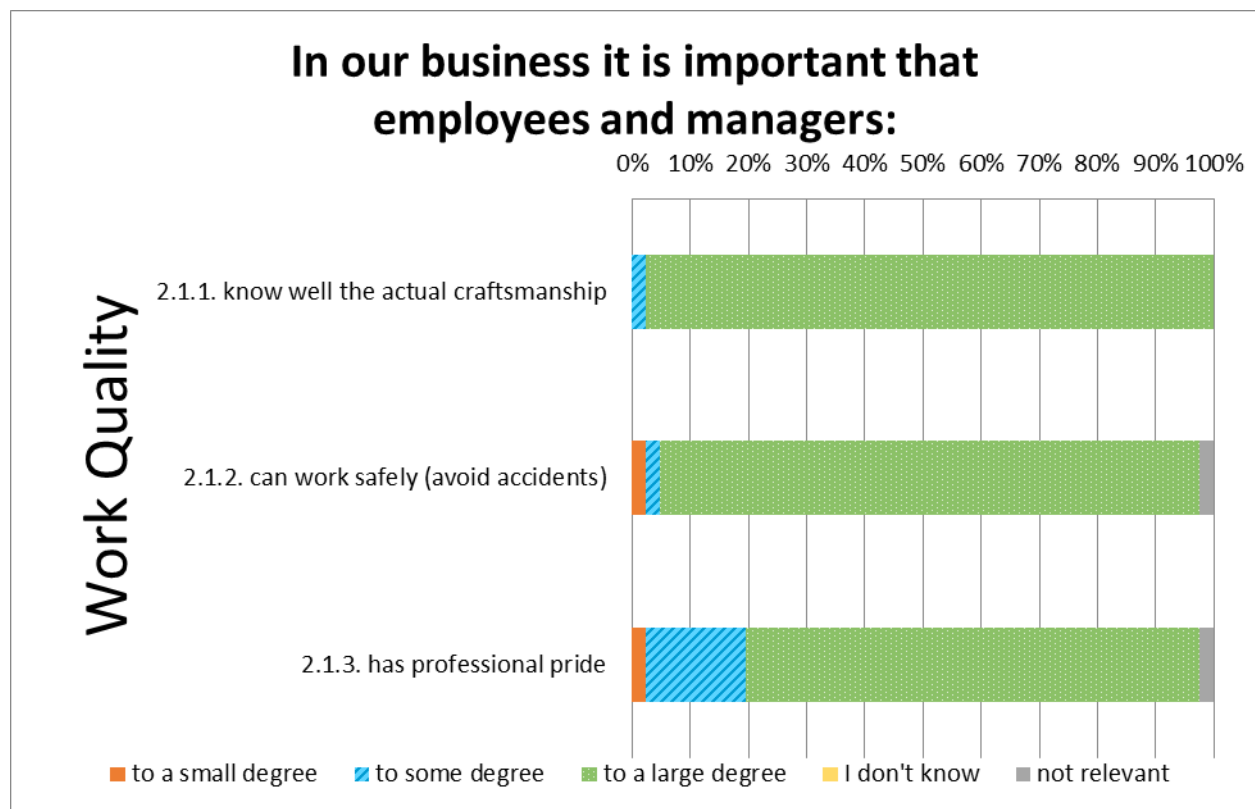


Figure 3: Work quality skills category

The craftsmanship and the safety are considered paramount elements required in the skillset of the workforce. 78% of the managers consider professional pride as an important element.

The consequence of the results depicted in the first two bars (2.1.1. and 2.1.2.) for vocational education and training (VET) practices, is that a workplace based learning approach should be applied.

If VET is going to target, address and include professional pride, then that must be done by establishing a close partnership between the companies and the VET schools. It will be challenging to just apply VET as a stand-alone tool to target this area.

2.2. Business Orientation

In the “business orientation” category, the following statements were included:

- 2.2.1. is loyal to the company/organization
- 2.2.2. have a good understanding of the business beyond his/her own work

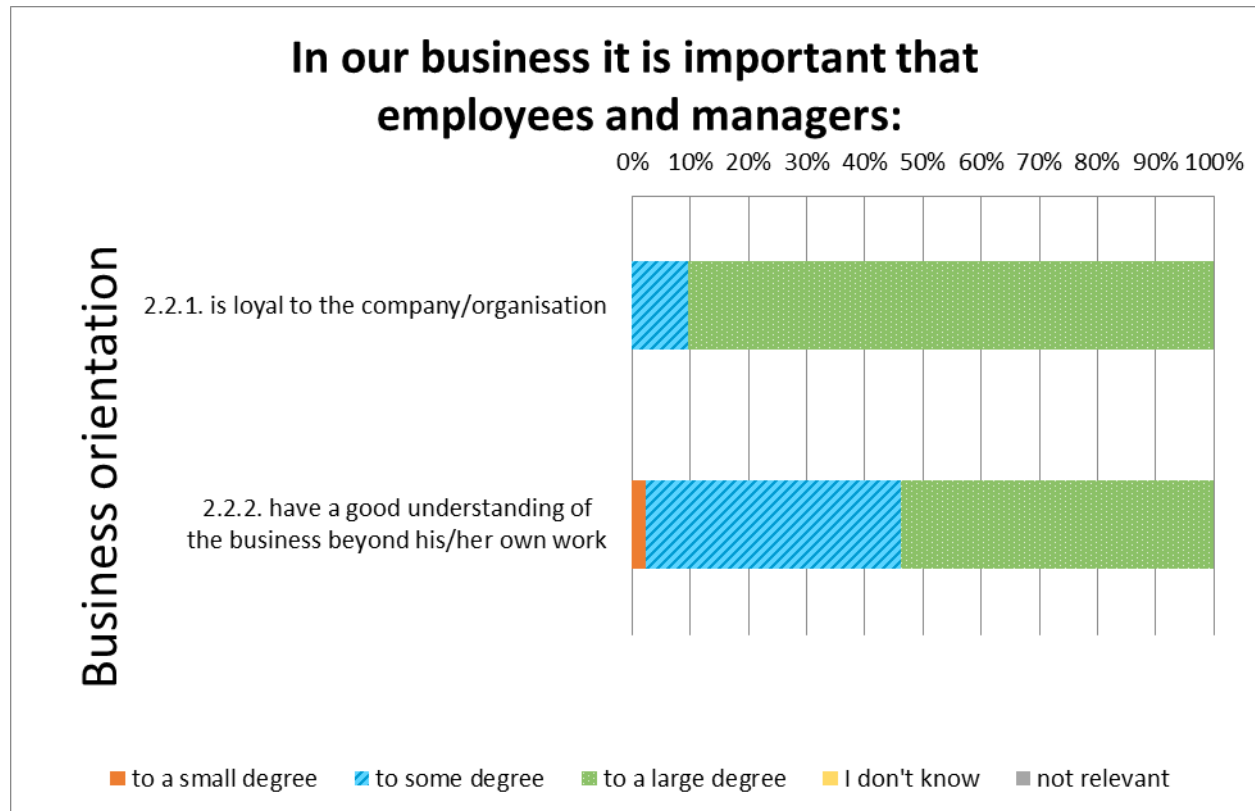


Figure 4: Business orientation skills category

Loyalty towards the organization is considered to be very important by 90% of the managers. Slightly more than half of the managers consider it is very important to have a wider perspective in the understanding of the production in the fish farming company. At the marine cages, staff works in teams. Each person in the team specializes in one or several job activities. However, at the same time each person should know the most important components in the job operations that the colleague is specializing on. In this way, work and job operations may go on if staff is absent from work. A modern VET program may underline and highlight the dependency between different production stages and work operations.

2.3. Proactivity

In the “proactivity” category were included the following statements:

- 2.3.1. can see what work is needed to be done without asking anyone
- 2.3.2. have the ability to come up with ideas and propose changes

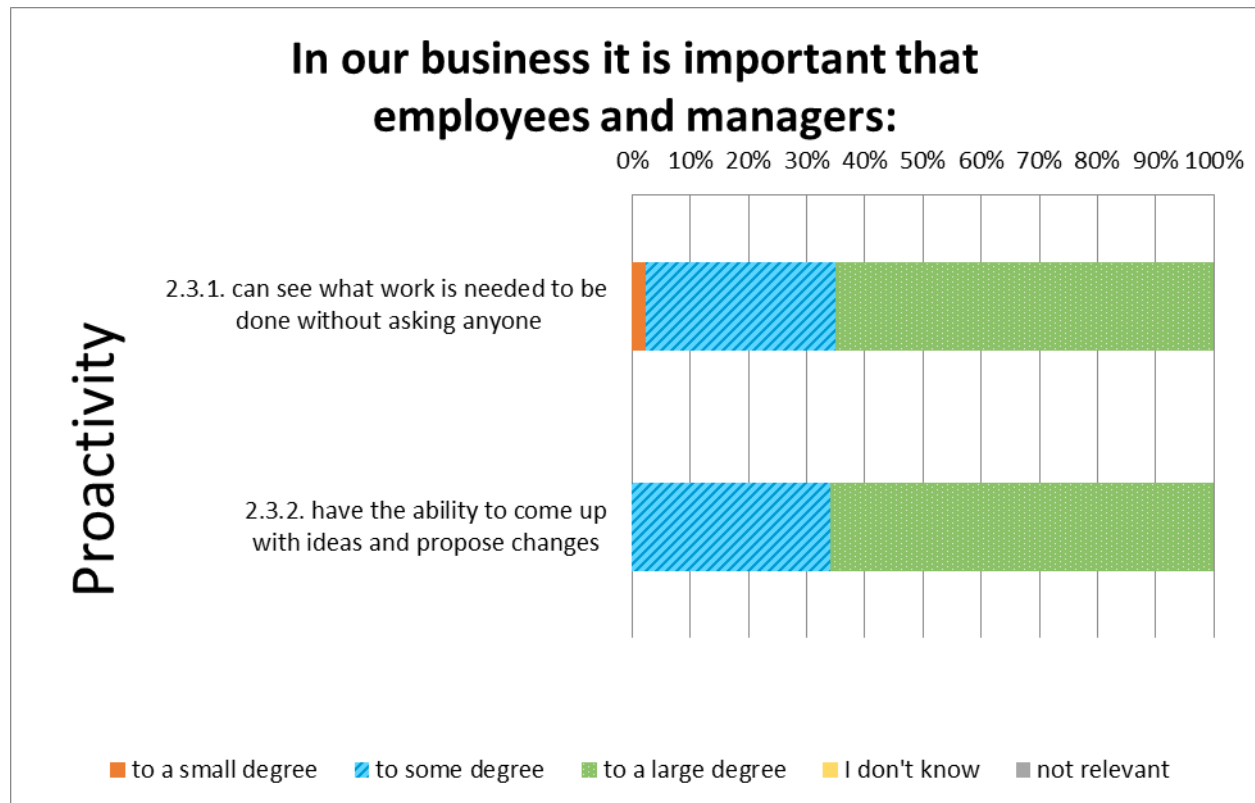


Figure 5: Proactivity skills category

65% of the managers consider that it is very important that the employees are able to recognize and solve upcoming cases and problems in the production on their own or together with a colleague. Same high percentage considers that it is very important to be able to actively contribute with ideas and propose changes meant to improve the situation or solve the problems.

Such skills can be trained in targeted courses, but currently they are not part of the journeyman certificate in Norway. This will require training from experts outside of the traditional VET system.

2.4. Collaboration

In the “collaboration” category the following statements were included:

- 2.4.1. collaborate well with others
- 2.4.2. can work with colleagues from different countries

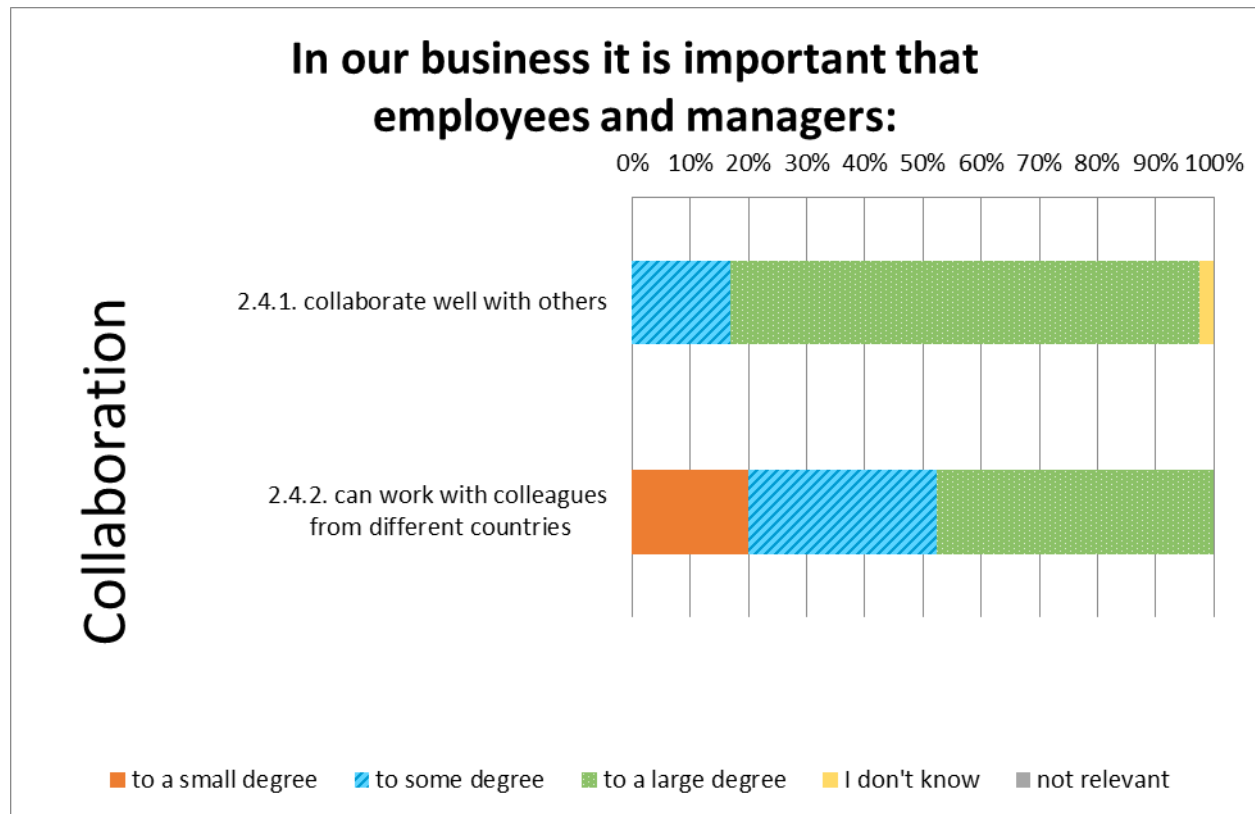


Figure 6: Collaboration skills category

Collaboration is a very important aspect as indicated by 80% of the managers. The second statement in the category referred to collaboration with colleagues from other countries and also here 80% of the managers consider this to be important (46% very important, 34% some importance). In Norwegian aquaculture the workforce is quite diverse especially in the processing sector, whereby the second statement reflects this fact.

These data shows that VET courses should be organized in such a way that they strengthen collaboration between different productions teams in the same company in order to learn and transfer knowledge from each other. Additionally this will help building a common understanding of the business and the production processes. Further investigation should look into the usefulness of setting up collaboration activities between companies in the same sector, such that this may support transfer of knowledge and experiences in order to improve the production.

2.5. Independence

In the “independence” category the following statements were included:

- 2.5.1. can plan their workday on their own
- 2.5.2. can coordinate with others

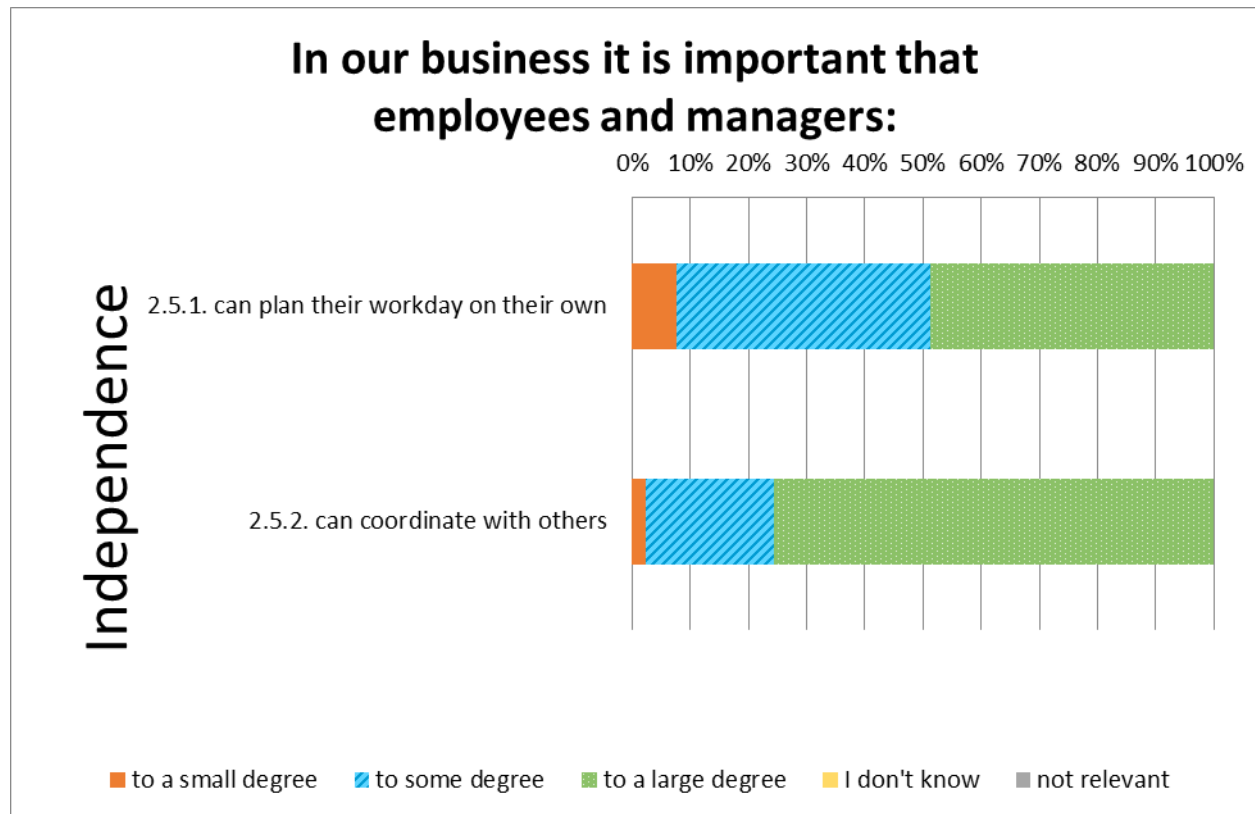


Figure 7: Independence skills category

75% of the managers consider very important that the employees are able to coordinate with others in the workplace. Approximately half of the managers consider that it is very important for employees to be able to plan their own workday. The results need further investigation, as there are significant differences between farming and processing work. To which degree may they have the ability to control their own working schedule?

Planning and coordinating with others are an important part of the journeyman certificate training. The results show that this must be kept and improved in the future VET programs.

2.6. Learning

In the “learning” category the following statements were included:

- 2.6.1. have an interest for learning and self-development
- 2.6.2. have the ability to contribute to changes and innovation work
- 2.6.3. have interest to teach others
- 2.6.4. can read and understand advanced instructions and manuals

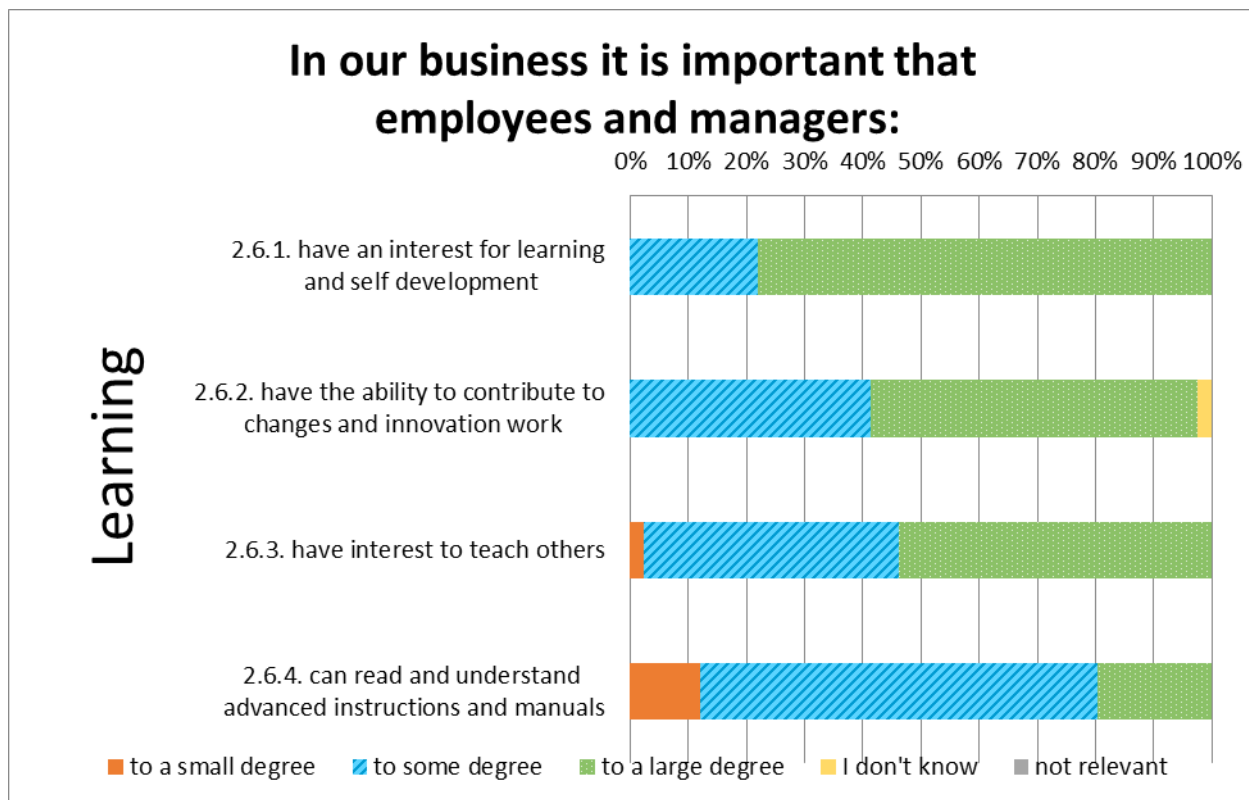


Figure 8: Learning skills category

The aquaculture industry is a fast developing due to technological innovations. Employees need to be motivated to continuously update their knowledge and skills. 78% of the managers consider as very important that employees have an interest for learning and self-development. Over half of them also consider very important that employees have an interest in supervision and teaching other staff.

The first bar (2.6.1.) shows that the staff must be able to follow up and specialize in various new working areas, for instance boat operations, ICT or treatment of cleaner fish etc. A modern VET system should be able to provide a wide aquaculture education, stimulating industry to afterwards offer specialist training through specialized VET courses thus supporting staffs self development and continuous learning of new skills.

The information in the bars (2.6.2 and 2.6.3) may affect the methods that are applied in a modern VET system. By including relevant tasks and activities, they may support and enhance application of work operations that are related to innovation process as well as group work related activities where

experienced staff helps teaching the less experienced staff. Such training must be developed together with the companies involved.

2.7. Digital Literacy

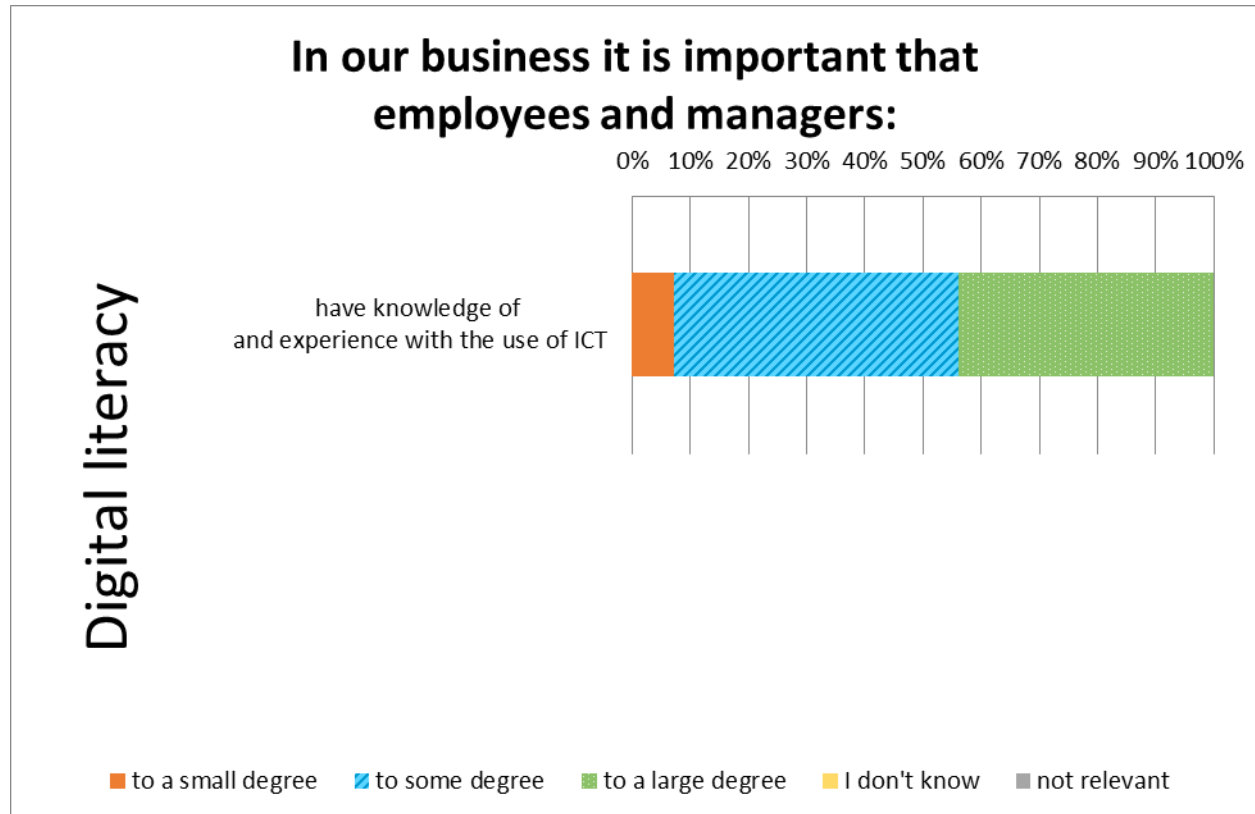


Figure 9: Digital literacy skills

44% of the managers consider as very important to have knowledge of and experience with the use of ICT. 49% of the managers consider this to be important to some degree.

These results shows that improved ICT skills are not among the highest priorities within the aquaculture industry. They shows that it is enough for the fish farming industry to have access to a limited number of staff that has the required ICT competences and skills. Such knowledge may probable be offered through specialist courses.

2.8. Communication

In the “learning” category were included the following statements:

- 2.8.1. takes frequent contact with their immediate leader
- 2.8.2. are good at communicating orally
- 2.8.3. are good at communicating in writing
- 2.8.4. can communicate in several languages

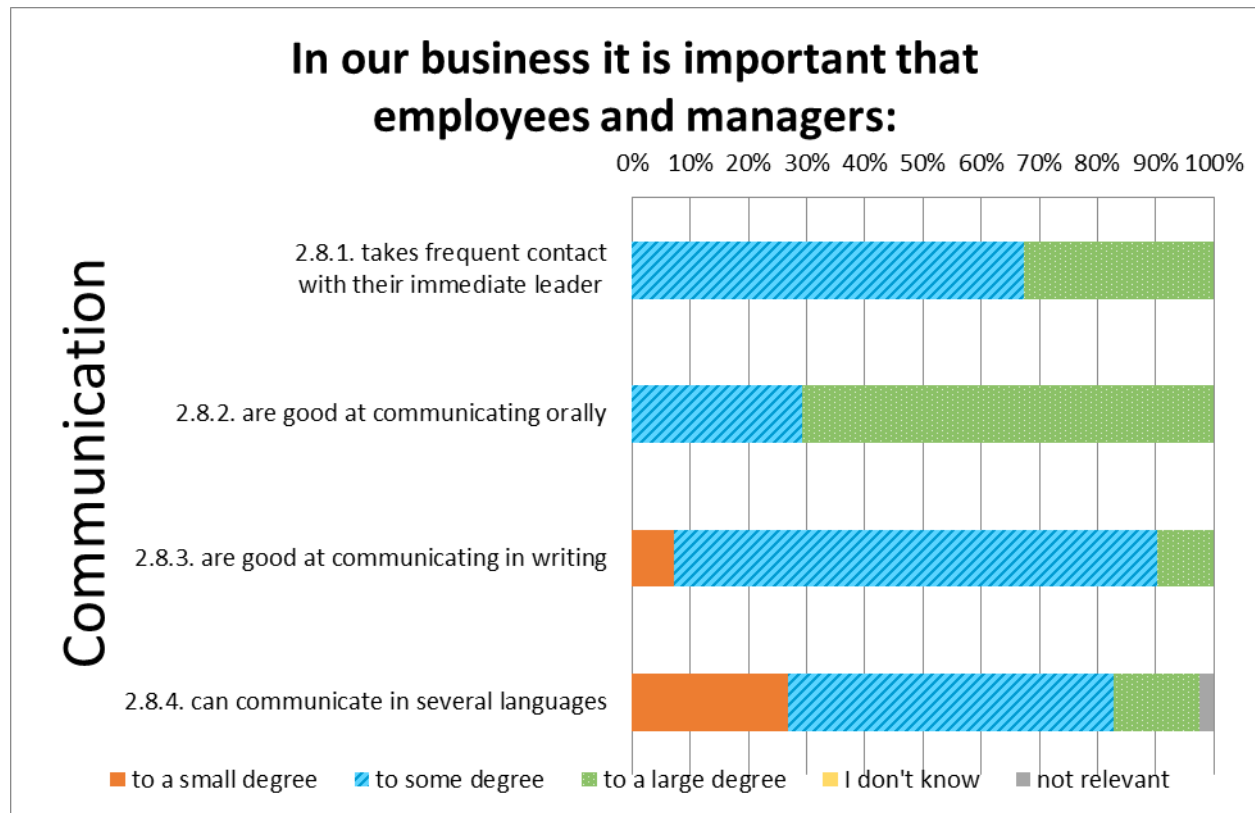


Figure 10: Communication skills category

The results show that oral communication is significantly more important than written communication. 70% of the managers consider oral communication to very important within the fish farming industry, while only 10% consider written communication as very important.

Frequent contact with their leader is considered to be very important by over 30% of the managers, a result that is also reflected in the accent put on the independence and proactivity.

The results indicate that the industry considers that the oral communication is more important than the written communication. However, in the VET school system in Norway writing is considered important. For instance, at the theoretical journeyman certificate exam, the students often need to develop a written production plan. Thus, this is an indication of a gap between what the VET school system considers to be important and what the fish farming industry highlights as important.

In the geographical area of Mid-Norway there are a lot of labor immigrants, which speak between 30-40 different languages. Despite of this the industry expects that the working language should be Norwegian, whereby they expect that it is not necessary to communicate in any other foreign language. However, is this realistic to achieve within a modern VET course where many people might need to communicate in what for them is a foreign language?

In the current system it is required to complete the journeyman certificate exam in Norwegian. Therefore, in order to achieve this the candidates must master the Norwegian language quite well at a working level.

Area 3: The company's recruitment needs

This chapter offers data related to the recruitment needs in the fish farming companies in Mid-Norway, and a number of factors in the society that are connected to the recruitment processes of new staff. These data help identifying key challenges for rural areas in the costal zone. This type of data is not directly linked to how to organize aquaculture VET courses. They will, however, illustrate typical challenges, which costal rural areas face and help us to better understand why it is important to improve and deliver aquaculture VET courses to staff that are in full job in these areas.

Aquaculture companies' short-term recruitment needs and reasons for refusal of job offers, are targeted in the first question:

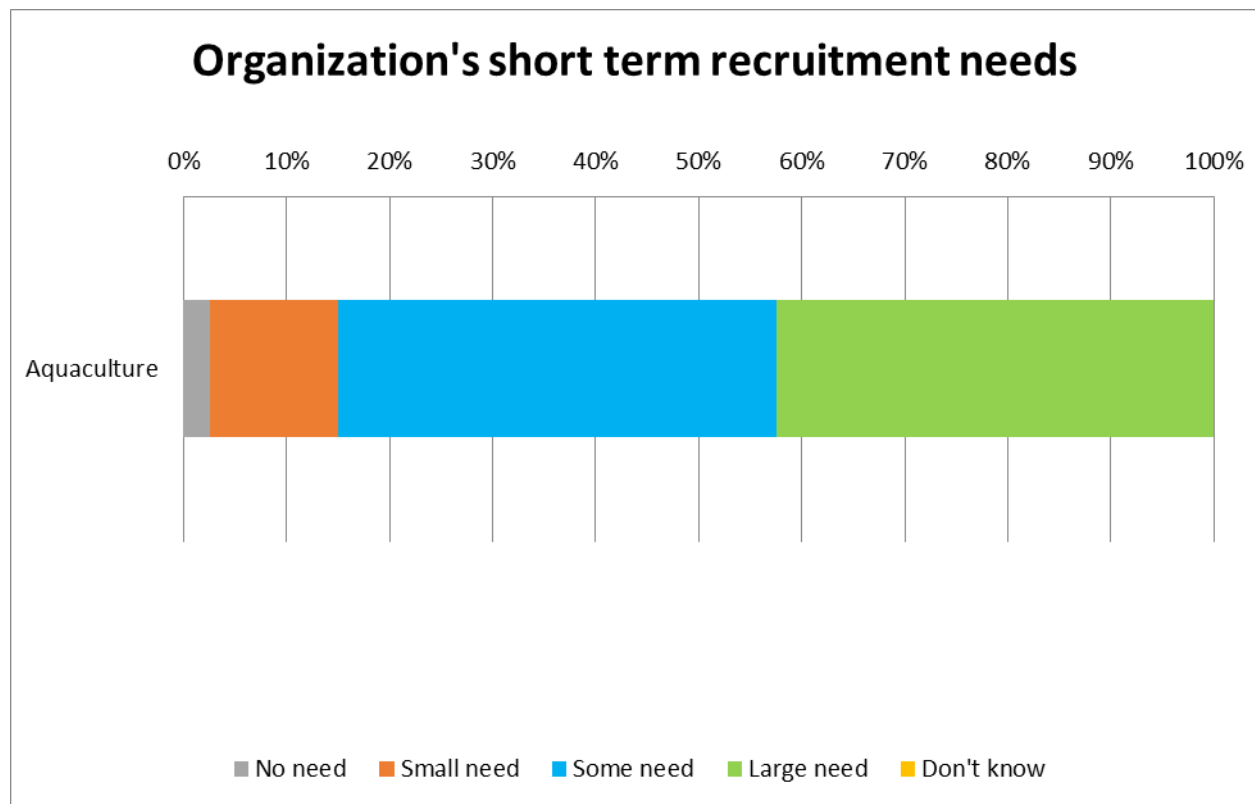


Figure 11: Short term recruitment needs

42.5% of the managers indicate that on short term their organization has a large need to recruit more people and another 42.5% have some need to recruit more people.

These results show that there is a significant shortage of workforce within the aquaculture industry today. This is a consequence of the fast expansion in the aquaculture industry during the recent years, whereby it has been necessary to recruit many more people to work in the fish-farming sector. Thus, VET activities as for example short specialist courses, must be offered more frequent compared to some years ago. Indeed, capacity building must support modern aquaculture VET programs in order to catch up and provide aquaculture qualifications to those who lack them.

3.1. Reasons to refuse job offers

The next statements aimed at investigating which are the reasons the companies' job offers are refused.

The reasons have been categorized as follows:

- 3.1.1. Competition with other companies
- 3.1.2. Local job market
- 3.1.3. Education and training
- 3.1.4. Society related issues

3.1.1. Competition with other companies

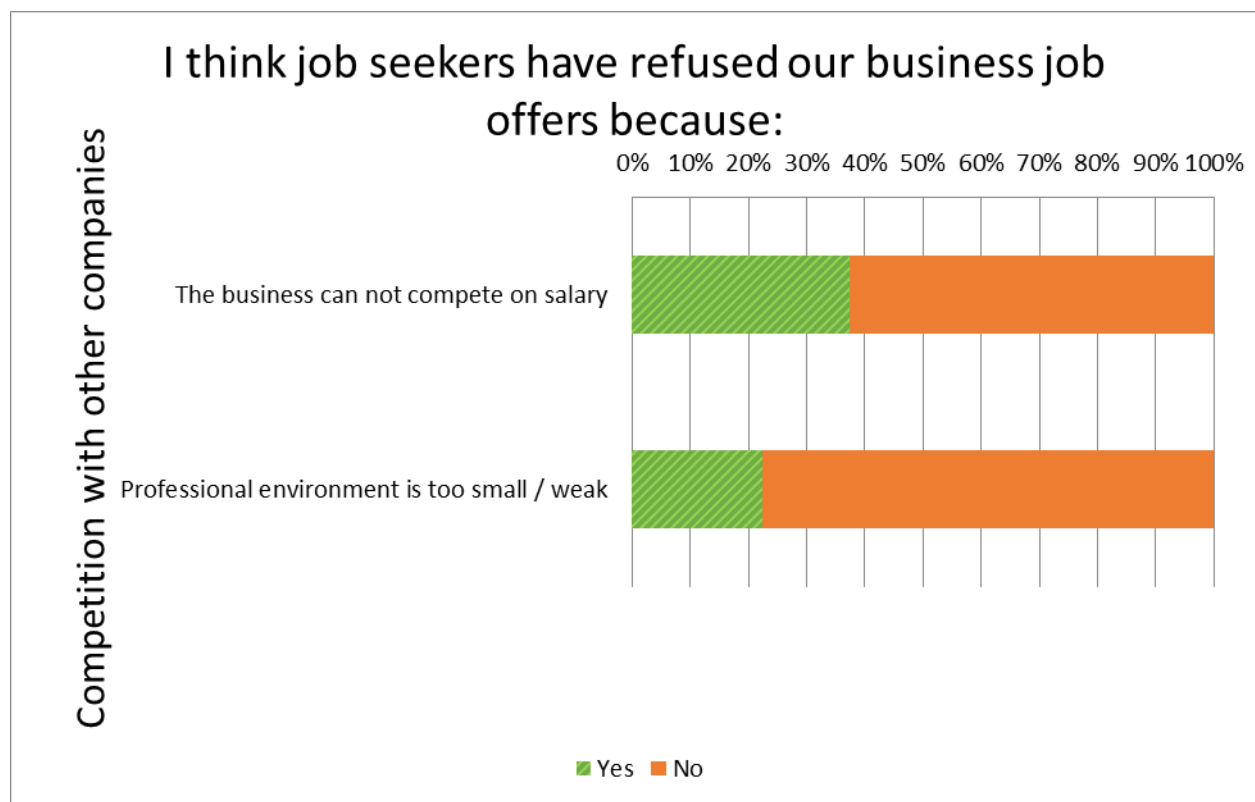


Figure 12: Job offer refusal – competition with other companies

A third of the managers have indicated lack of competitiveness with regards to salary as a reason to refuse job offers. One out of five indicate that the professional environment is too small or weak as a reason.

Many of the managers work in the largest, global, fish farming companies established in Norway. The lack of competitiveness with regards to the level of salary needs to be further investigated, since the salaries for those working at the marine cages are high in these companies. For the processing part of

the largest companies, the recruitment methods vary a lot. One of the companies recruits new staff by themselves, while the others use specialized recruitment companies.

3.1.2. Local job market

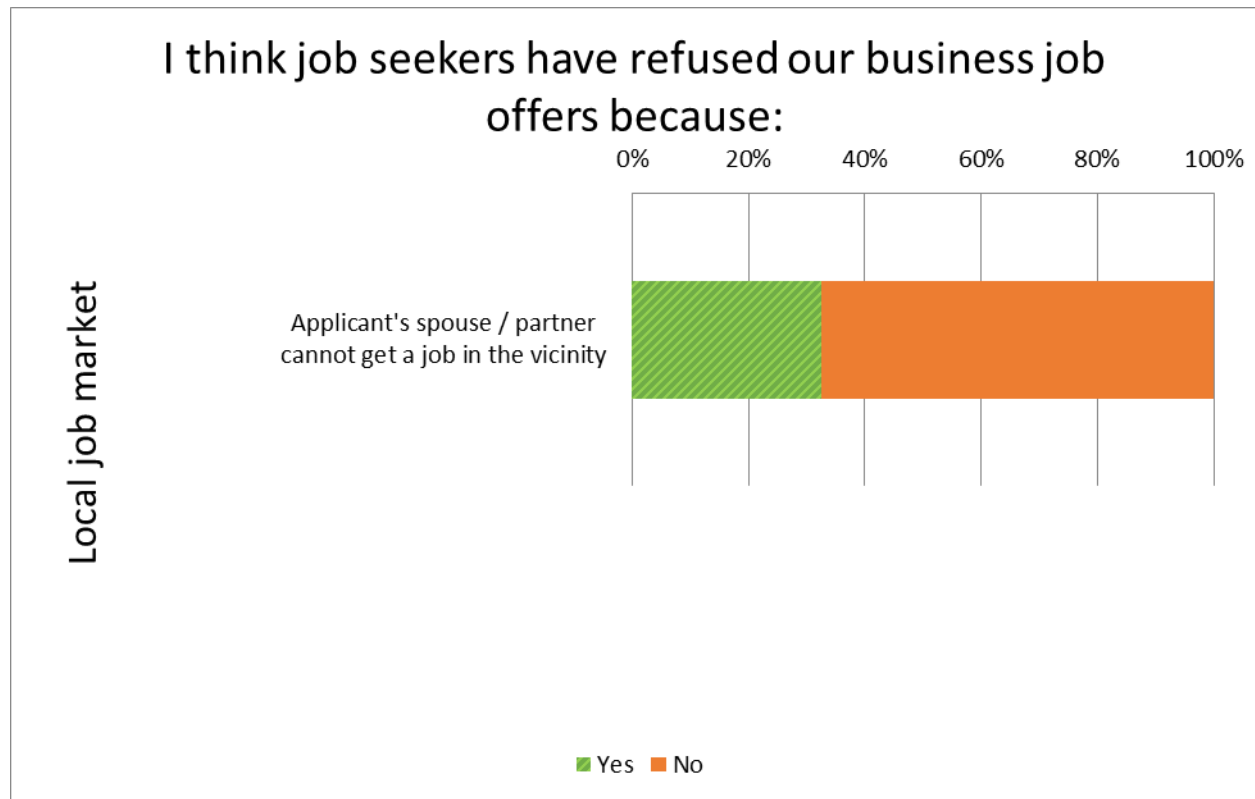


Figure 13: Job offer refusal – local job market

The aquaculture industry related production and processing operations take place in rural areas that are located in the coastal zone. A quarter of the managers mention the lack of job opportunities for spouse or partner as a reason to refuse the job offers in the aquaculture sector. The fish farming industry dominates in these rural areas and there are limited opportunities to get jobs in other sectors, e.g. the public administration in the municipalities.

Aquaculture VET courses cannot offer solutions to this challenge. It is, however, important to remember that aquaculture VET courses may strengthen the economy in the existing VET schools. Then these schools may get an opportunity to offer other types of VET programs in other areas. Thus, if the fish farming companies support the existing VET schools through aquaculture VET training, this may indirectly strengthen the capacity to offer VET training to other target groups that may want to work and live in the rural areas. Typical examples are education of health care workers, or people working with business administration.

3.1.3. Education and training

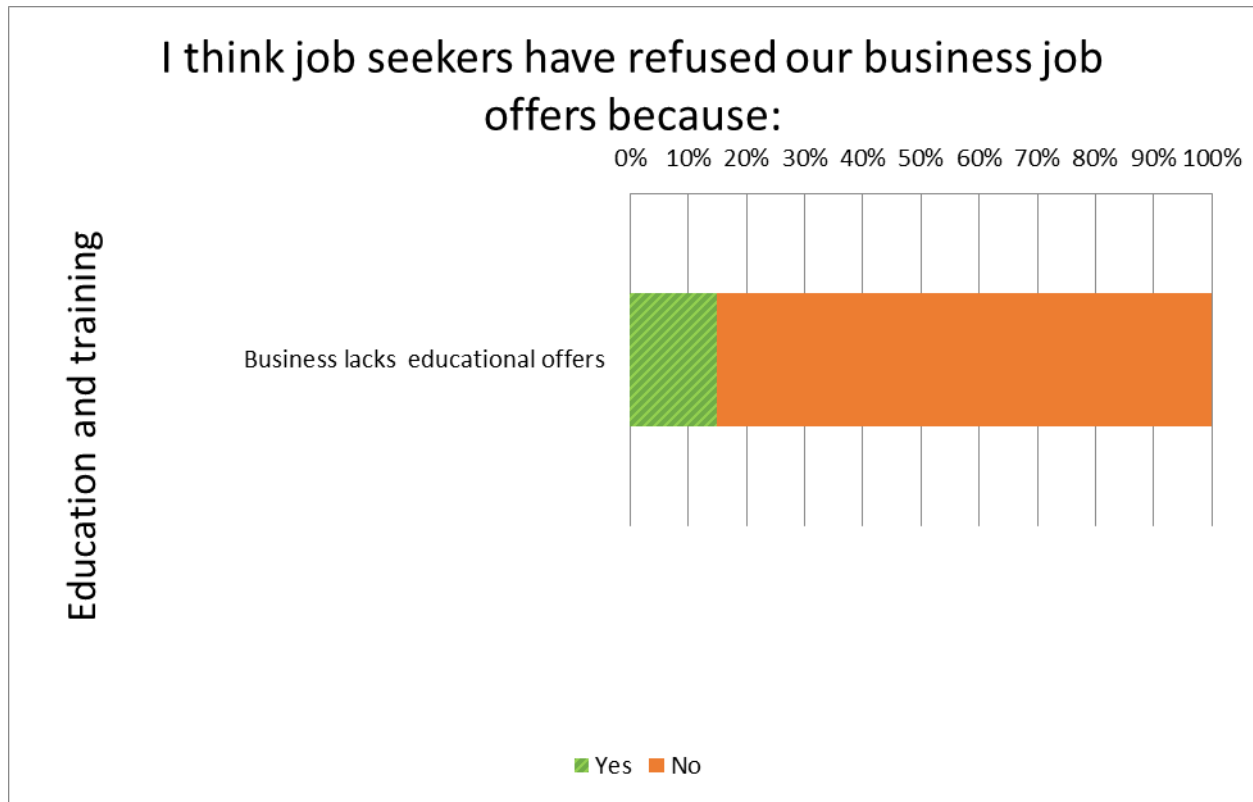


Figure 14: Job offer refusal due to lack of education and training

Approximately 15% of the managers report that lack of educational offers within the company as a potential reason for refusing a job offer.

Our data shows that lack of access to aquaculture VET courses is considered to be a relatively small challenge by the fish farming companies today. In 2014, a study made by SINTEF⁵, showed that every second person in a Norwegian fish farming company lacked qualifications (Reference 1). In addition, SINTEF documented that skills based up on own work experiences were still supposed to be important during the next upcoming years in the fish farming industry. This attitude has not changed during the last three years.

⁵ Stiftelsen for industriell og teknisk forskning (The Foundation for Scientific and Industrial Research) – is one of the largest independent research organizations in Europe and it has its main offices located in Trondheim, Norway.

3.1.4. Society related issues

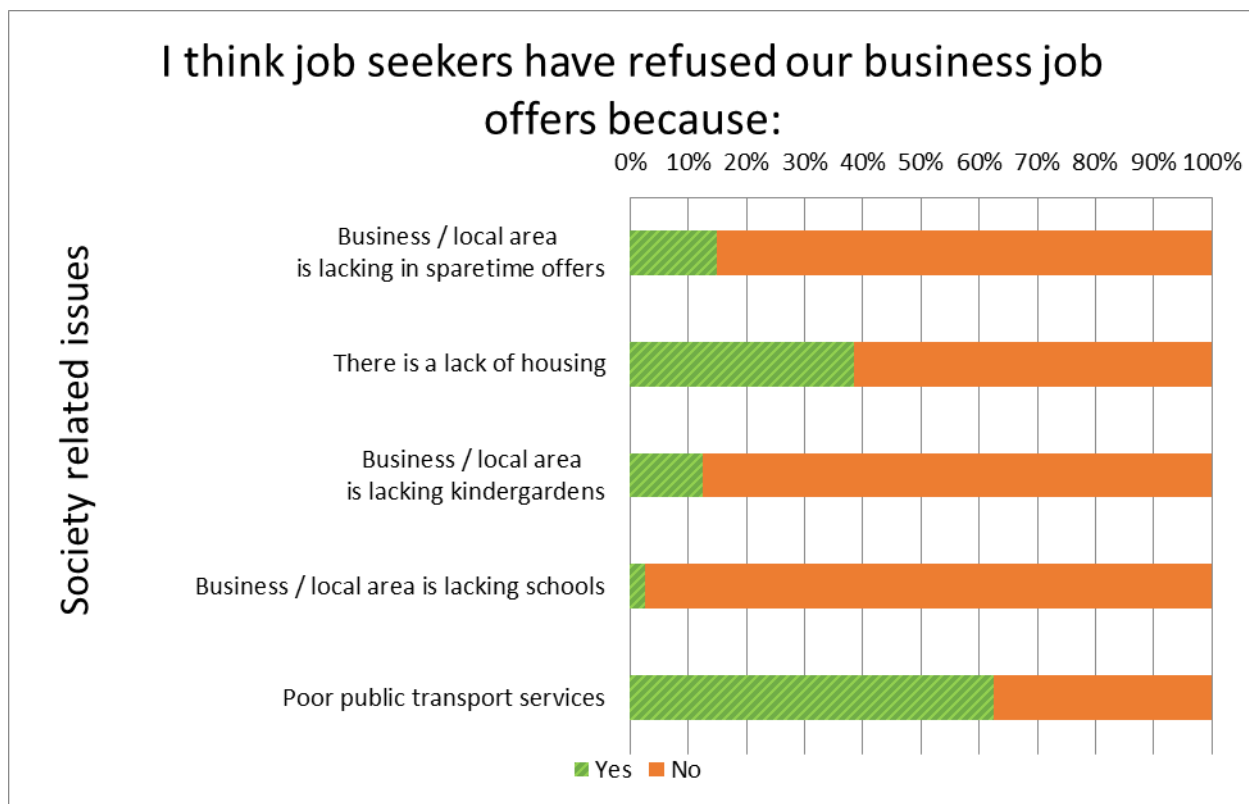


Figure 15: Job offer refusal – society related issues

36.6% of the managers consider the lack of housing as a reason for job offer refusal and 61% indicate as a reason the poor public transport services.

Fish farming industry cannot resolve these issues. These are complex problems that require involvement and cooperation between municipalities, county as well as private constructions companies.

It is still important to remember that current aquaculture VET practices in Mid-Norway often requires transportation of staff to the VET schools. This is an expensive solution for the companies. There are few or no alternative solutions regarding public transportation due to natural constrains like fjords, mountains, valleys, access to ferries and periods with bad weather. In the future, however, aquaculture VET courses may be more accessible and affordable if modern and flexible VET solutions included some e-learning.

3.2. Retirement

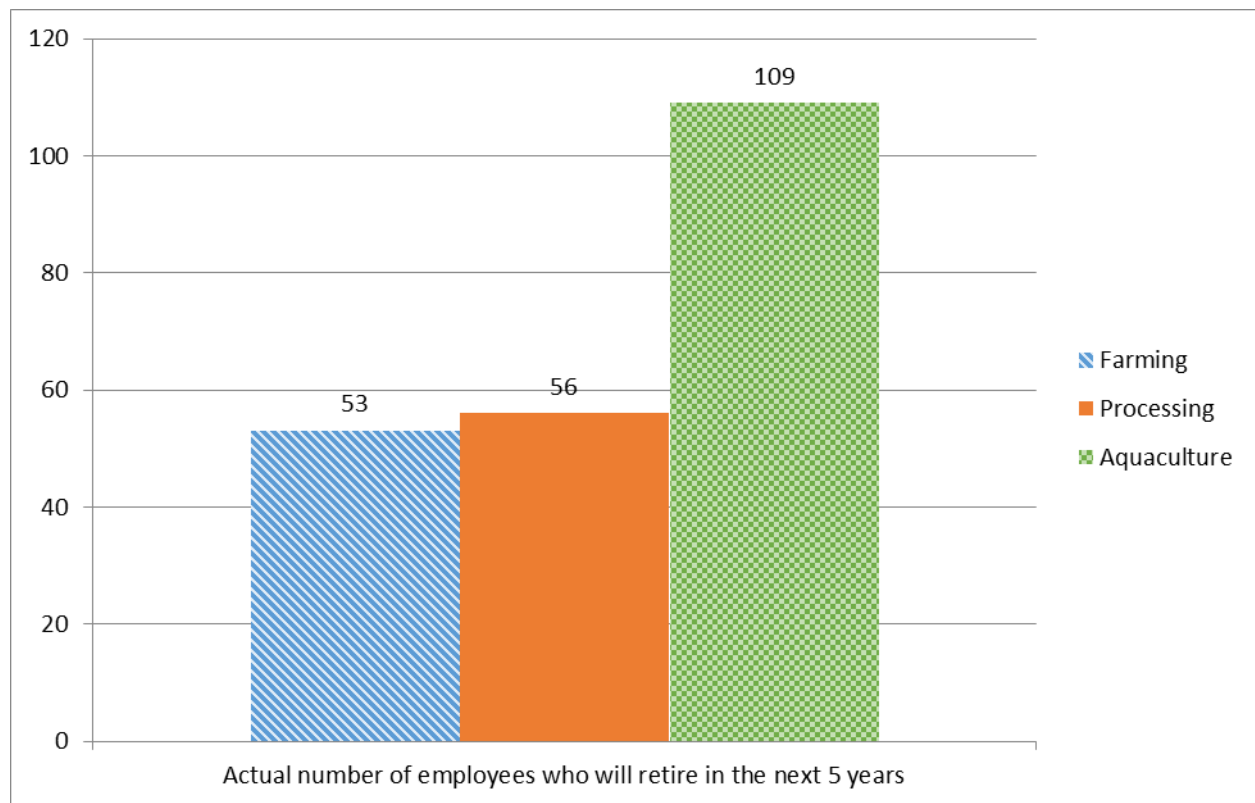


Figure 16: Number of personnel scheduled for retiring in the next 5 years

The Guri Kunna aquaculture VET school at Frøya, Mid-Norway, produces approximately 40 skilled workers per year. During the next 5 years they expect to educate approximately 200 persons with aquaculture qualifications. 27% of those students will be needed just to replace the farming staff that is going to retire (109 persons). The rest of the 144 students will be available on the working market to replace the people leaving due to various reasons (e.g. changing careers) and for the new recruitment positions if the industry is going to keep on growing and expanding. Some of them may also be recruited by the processing industry, though the majority of the processing industry workers are recruited from abroad.

3.3. Shortage of skilled workforce and potential effects

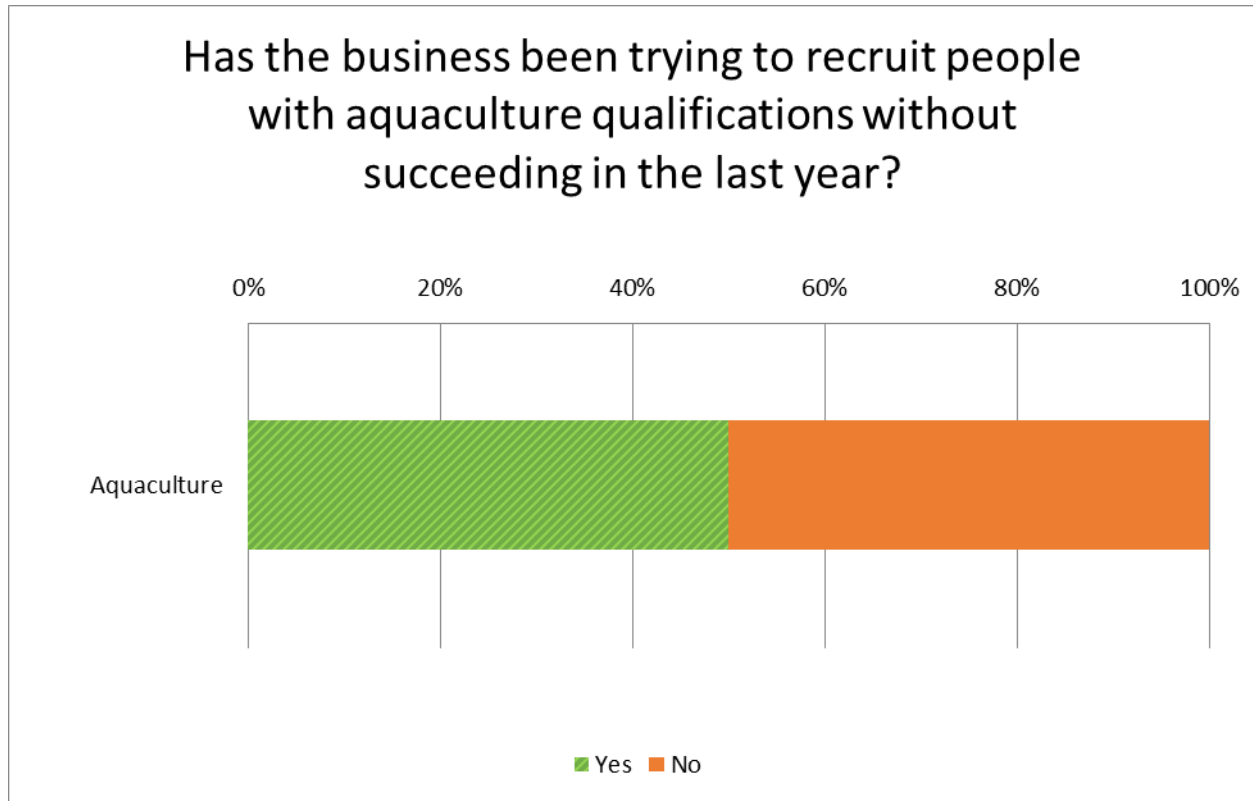


Figure 17: Failed recruitment of people with the desired skills

Half of the managers reported that their company tried without success to recruit people with aquaculture qualifications. The current aquaculture based VET school system is not able to produce the required amount of staff having the appropriate aquaculture qualifications, which today is required by the growing fish farming industry. It takes 4 years to educate a person with appropriate aquaculture qualifications, whereby there will be a lag in the public educational system when the industry grows fast. There are also other factors that might influence these, e.g. the number of personnel within industry that have got their aquaculture qualifications, whereby potentially further investigation is needed.

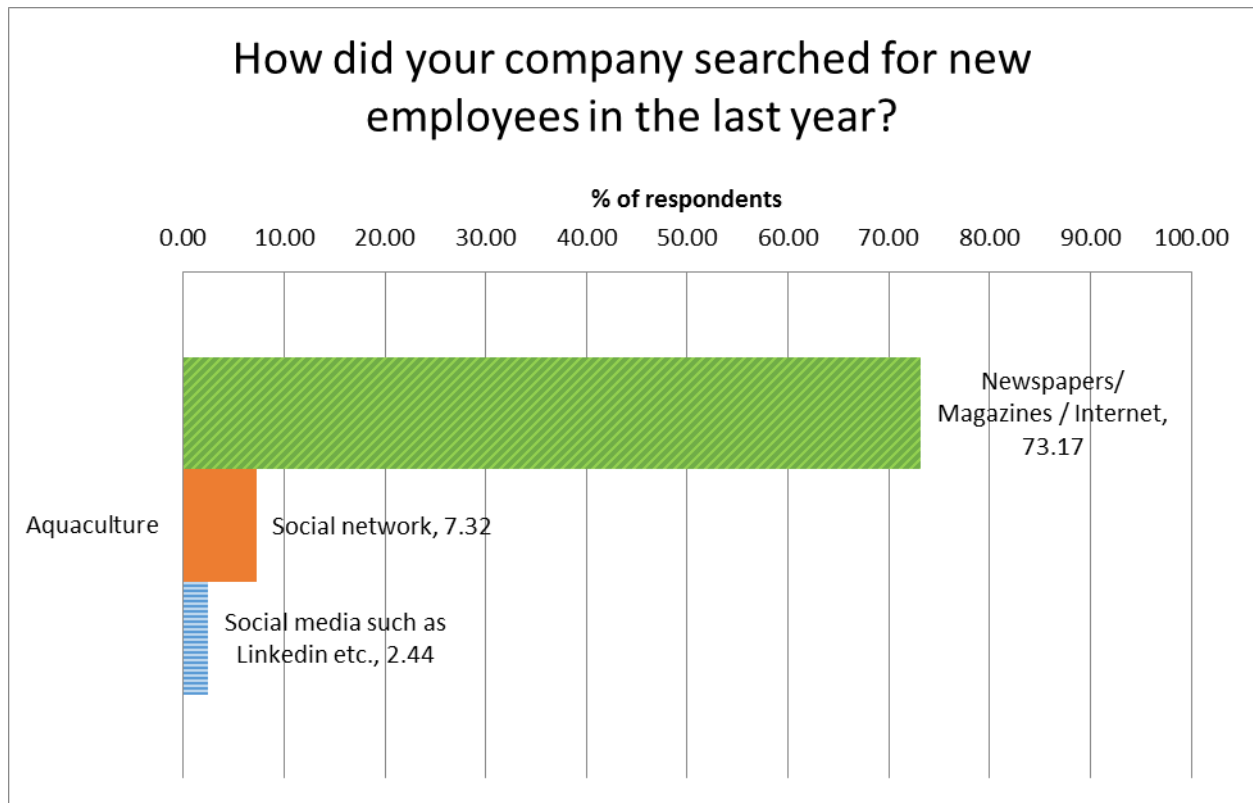


Figure 18: Methods to advertise new job positions

The aquaculture industry applies traditional channels when recruiting new personnel. They apply job advertisements in printed or online media. Only 2.5 % of the managers apply social media, while 7,4% tries to apply social networks.

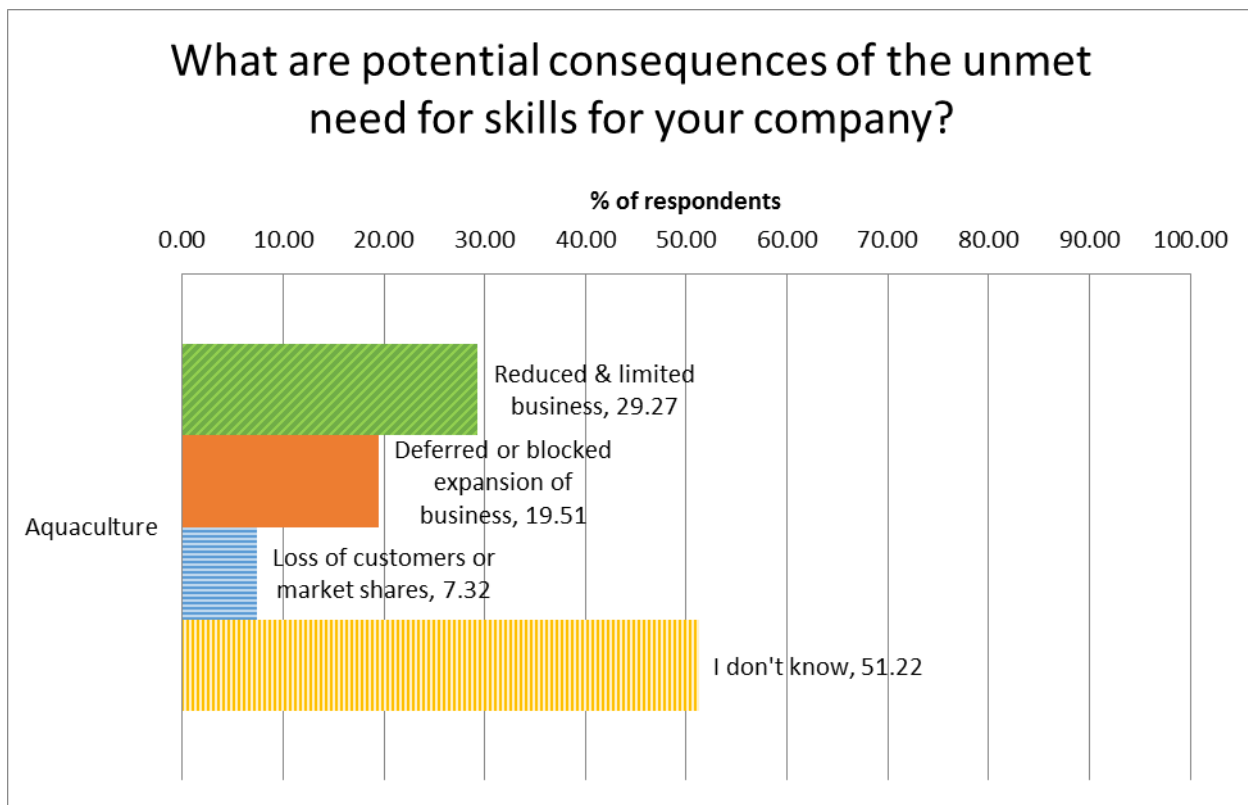


Figure 19: Effects of the shortage of skilled workforce

Over half of the managers abstain from indicating specific effects, as this is a quite complex issue. However about a third of them indicate that the consequences will be reduced and limited production and processing activities. 1 out of 5 managers replies that the shortage of employees with aquaculture qualifications will hinder or reduce the expansion of the production and processing capacities in their company. Only about 7% indicate that this can lead to loss of customers and/or market shares. Access to a modern aquaculture VET system that may educate personnel from industry, while they are in full job, is needed in order for the fish farming industry to keep growing. It is a key issue for 20% of the managers to get access to staff with appropriate aquaculture qualifications.

Area 4: The company's future need for new competence

How does the fish farming companies' select their strategy for recruitment of staff that has got recognized aquaculture qualifications?

4.1. Recruitment strategy

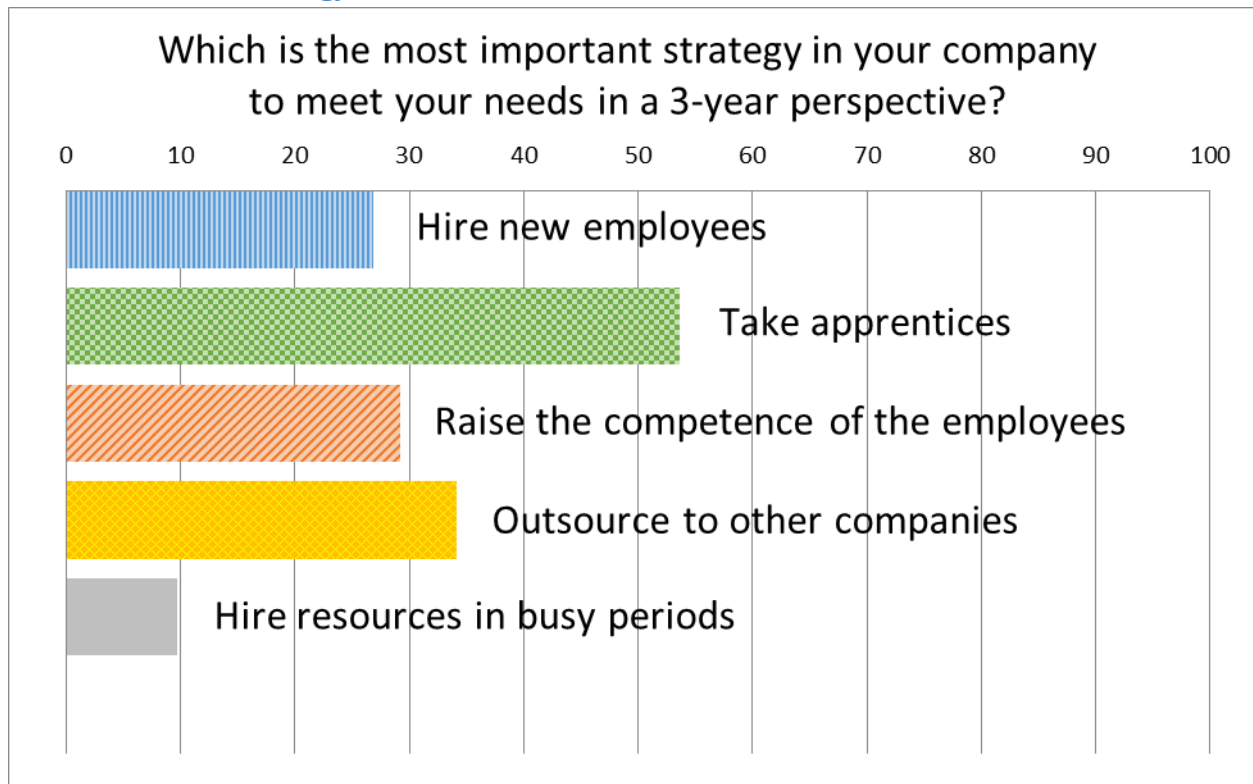


Figure 20: Aquaculture companies' recruitment strategies

Figure 20 displays the recruitment strategies that the fish farming companies apply. The managers report that 53% of the aquaculture industry applies the apprenticeship system as their most important strategy for recruitment of a workforce that has got their aquaculture qualifications. 1 out of 3 companies (34%) prefer to outsource work operations as their second most important strategy. This is even more important than raising the competence of their employees (29%) such that they get documented aquaculture qualifications, or hiring new employees (27%).

To recruit new staff through the apprenticeship system is an easy and safe operation. It often start by letting students during their first 2 years at the VET school, get some weeks with practice in the companies. If this works well, the students are offered a contract as apprentice for a period of 2 years. After passing the practical exam, they may start working as for instance husbandry staff.

Outsourcing is today a well-known strategy within the farming companies, which prefer to specialize on increasing their production of farmed salmon and trout. They apply it on many work operations, whereby it seems to be applicable as their second most important “recruitment strategy”, when they lack personnel with qualifications.

To raise the competence of their staff through aquaculture VET programs is the third most important strategy for recruitment of personnel with aquaculture qualifications. The importance of this strategy is at the same level as hiring new personnel.

By modernizing the aquaculture VET program there is a potential of raising the importance of the third most important recruitment strategy that is applied today.

4.2. Required Types of Vocational Education and Training

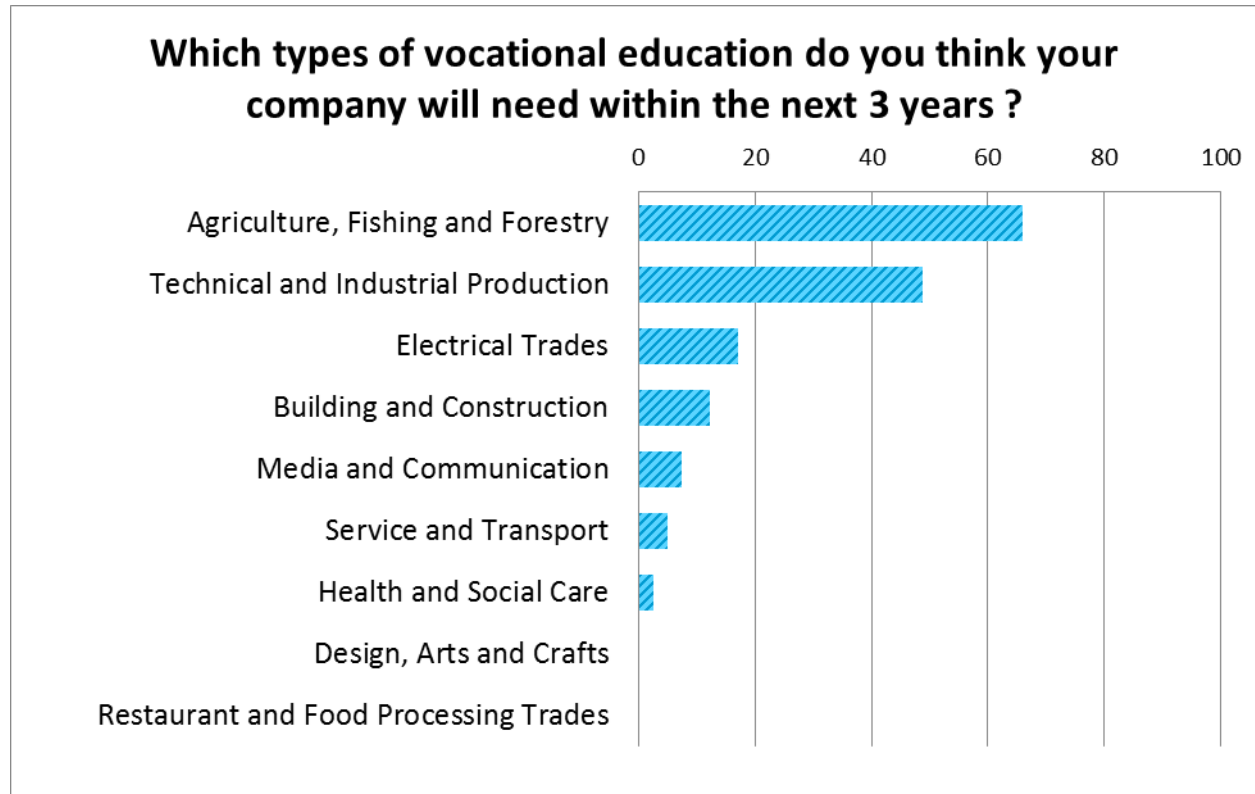


Figure 21: There are 9 VET programs in Norway. The graph shows which competences that aquaculture companies need during the next 3 years measured in percentage.

The two most important types of vocational education and training programs are aquaculture, which is part of the “agriculture, fishing and forestry” program (selected by 66% of the managers), and the “technical and industrial production” program selected by 49% of the managers.

To modernize the methods and tools applied within the aquaculture VET program, will help supporting these recruitment needs.

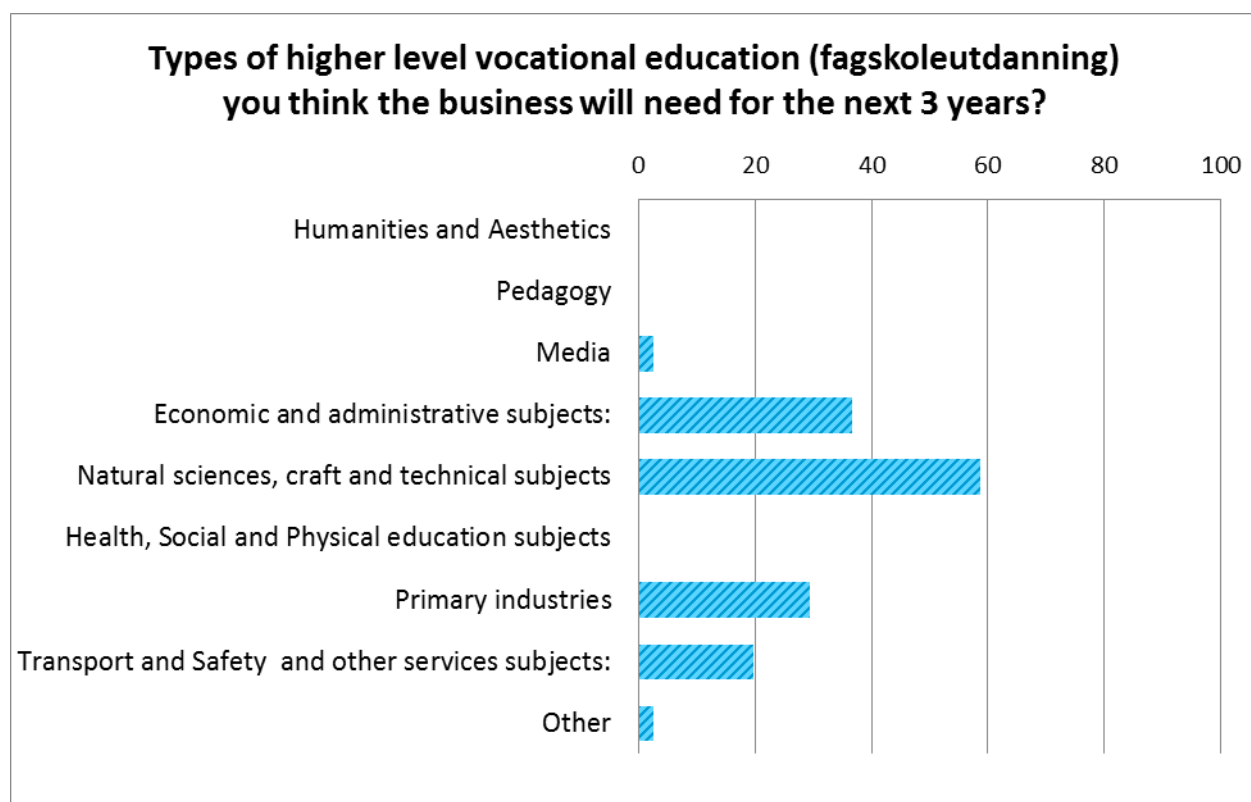


Figure 22: The needed types of higher-level vocational education (“fagskoleutdanning” in Norwegian) measured in percentage

“Fagskoleutdanning” is a level between the traditional VET programs and university education. Higher-level vocational education is requested by the aquaculture industry in 4 main areas: craft and technical knowledge, economy and administration, primary industries and transport and safety. These skills are not directly linked to aquaculture knowledge and skills. These types of personnel will typically offer supporting activities during the production and processing working activities.

4.3. Types of training activities

4.3.1. Short Term Training

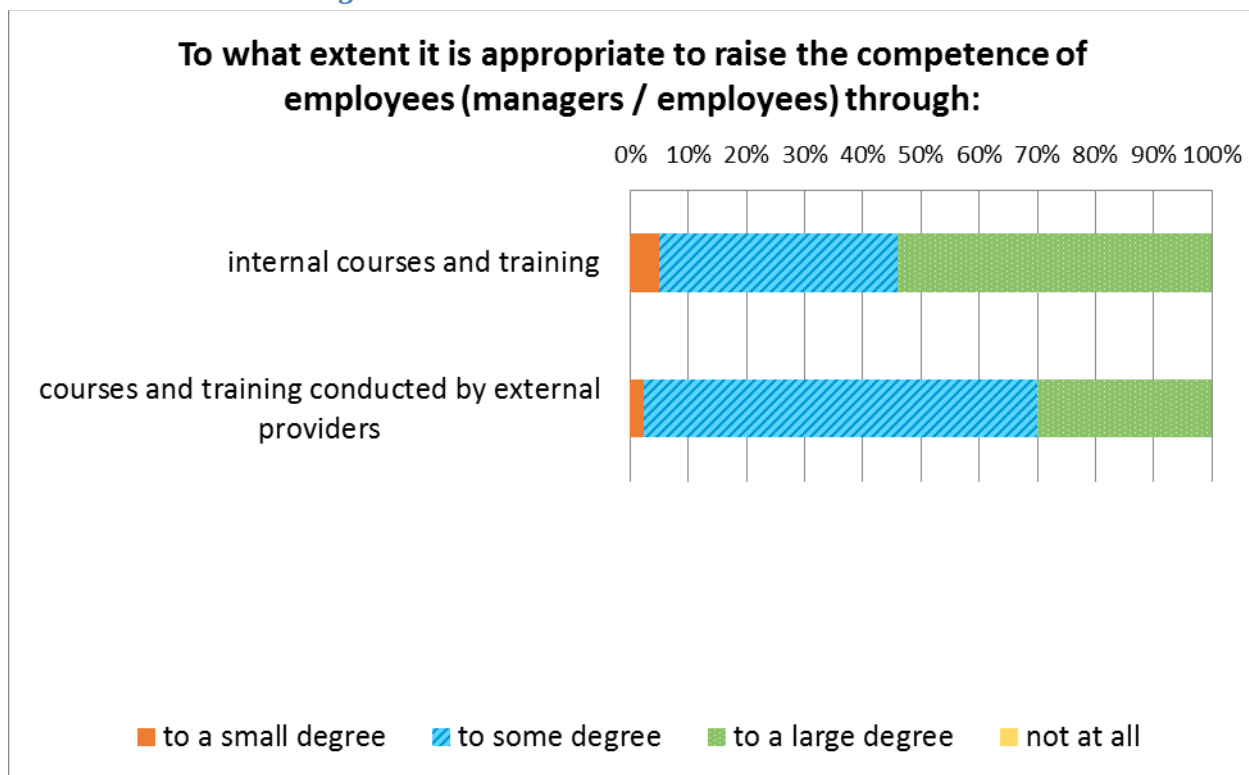


Figure 23: Needs for short term training activities

Short courses must often be provided based up on a legislation process. One or several of the 3 directorates that are regulating bodies in Norway, have regulated the fish farming industry market by making certain courses compulsory. Such courses could be from one to a few days long. Typical examples are driver licenses for boats, operating cranes, fish welfare courses etc.

For short time training activities, are internal courses and training an important mean of increasing the competence of the workforce as selected by over half of the managers. Experienced staff will support and train the staff that has less experience. 30% of the managers select external courses and training from external providers as the most important area, while 2 out of 3 prefer to engage external providers “now and then”.

4.3.2. Long Term Training

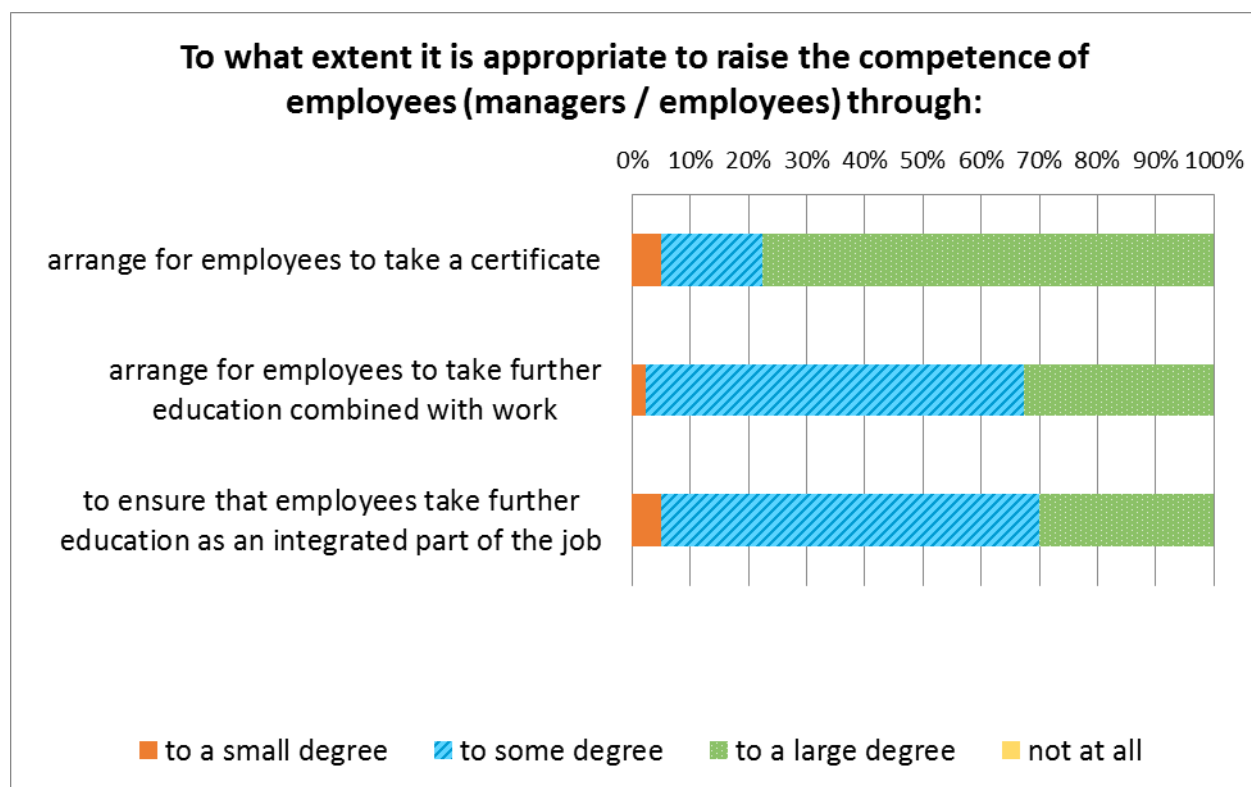


Figure 24: Needs for long term training activities

VET courses offered to industry that leads to national recognized qualifications, have a strong position in the industry market in Norway. More than 75% of the managers claim that their companies to a large degree support long-term training leading to a national recognized journeyman certificate. It provides a wide scope of basic set of skills on which companies can rely for a broad range of their working activities. Candidates that have got this journeyman aquaculture certificate may work in several types of work operations and activities within the fish farms, making them attractive for companies where the activities to some extent follow the season. The quietest time is the winter period from January to March.

1 out of 3 companies makes to a large degree arrangement at the company level such that their staff may take a journeyman certificate when they are in full job. The rest of the companies claim that they do it to some degree. The last graph shows that the companies want their staff to study to a journeyman certificate as an integrated part of their job.

4.4. Areas Which Require Improvement of Skills

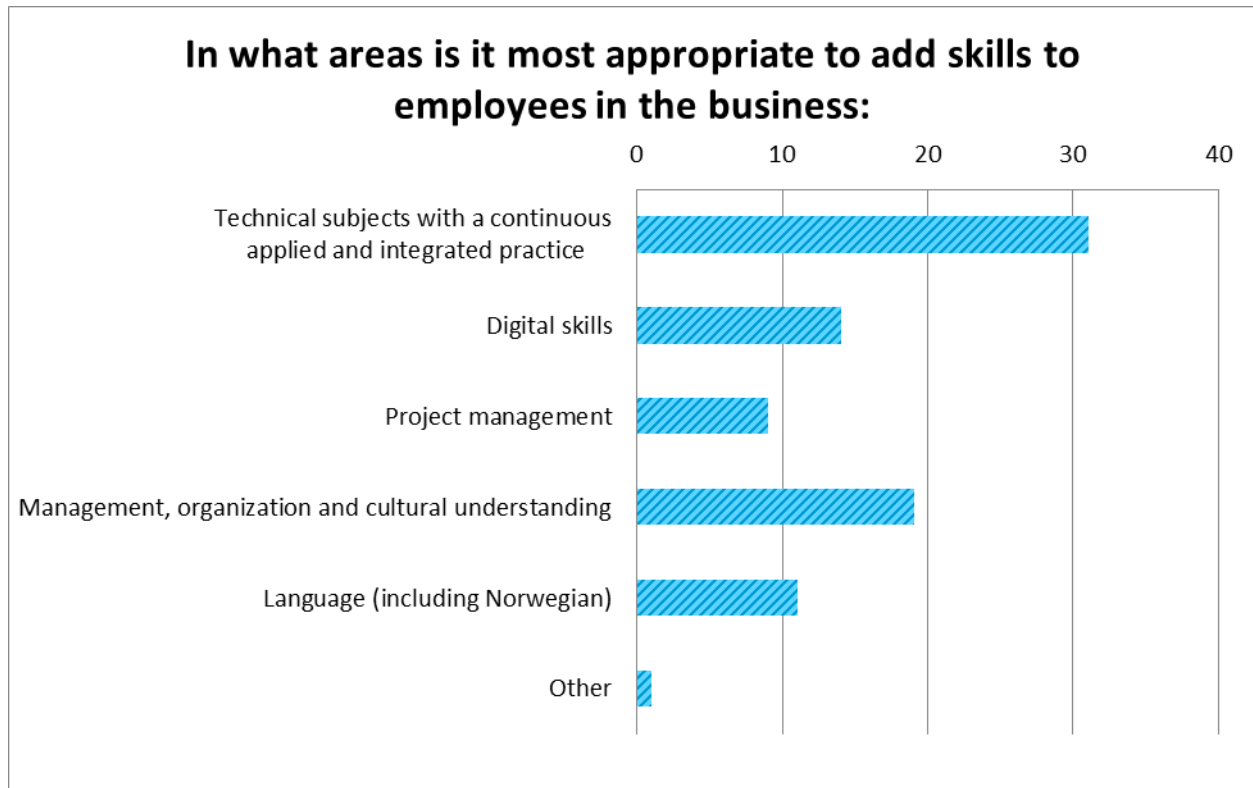


Figure 25: Areas which require improvement of skills of the employees

31 out of 41 managers (75%) report that courses addressing “Technical subjects with a continuous applied and integrated practice” are the most important ones. This reflects the needs in an industry characterized by fast technological developments. This is followed by courses leading to a “management, organization and cultural understanding” as the second most important area, selected by 19 out of 41 managers (46%), reflecting that the industry has become an international actor. For instance, on a daily basis the industry has to handle logistics involving a large numbers of lorries and staff from many different countries work together at the processing plants to produce the salmon or trout’s. 14 of the 41 managers (34%) report that the digital skills of the employees should be enhanced, which is consistent with the number of managers indicating that digital skills are important (section 2.7.). The reason is that ICT is applied to control and operate a lot of the fish farming equipment and operations. 11 of the 41 managers (27%) mention that language training is important. The working language inside the companies is Norwegian, whereby the foreign staff needs to get trained to speak and read that language. 9 out of 41 managers (22%) mention that project management is an important area.

4.5. Types of Engineering Education Needed

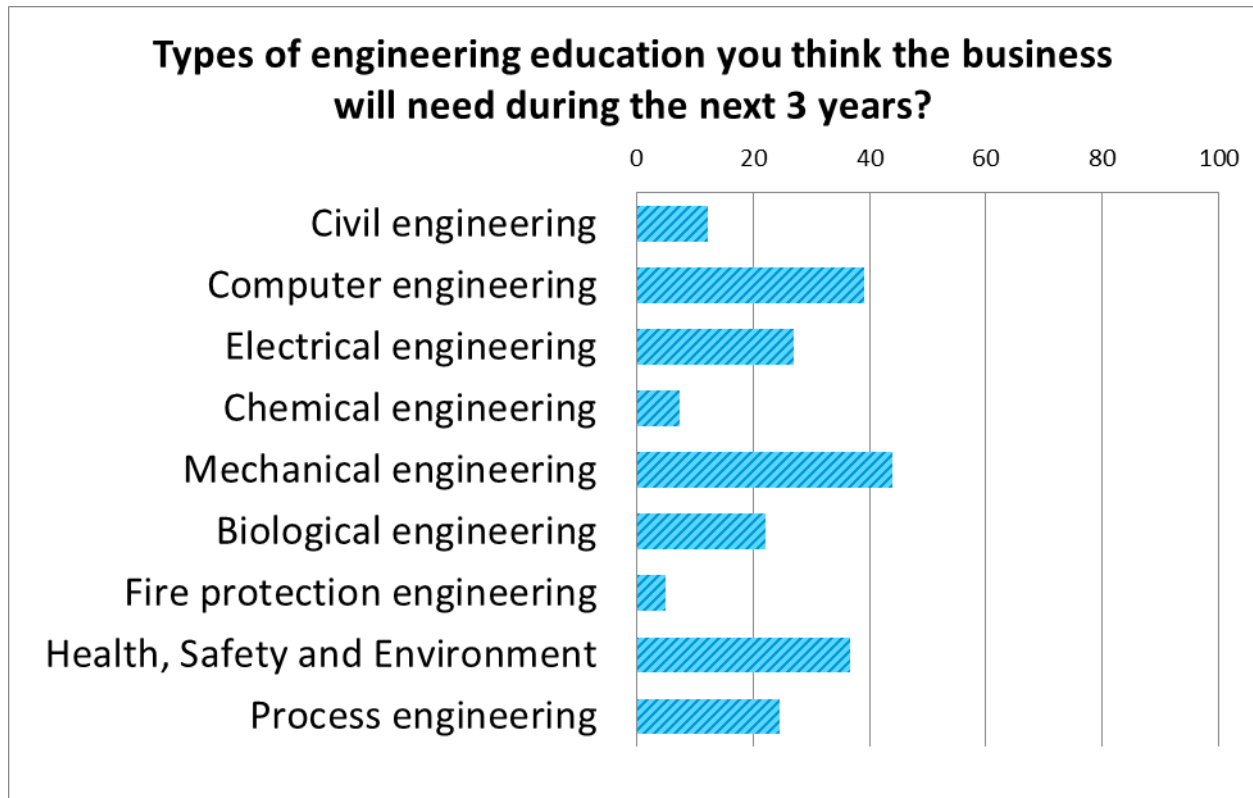


Figure 26: Types of engineering education needed during the next 3 years

The fish farming industry needs a broad spectrum of engineers during the next 3 years. The three most important areas are mechanical and computer engineering, and Health, Safety and Environment. Computer engineering is considered to be important due to digitalization of production processes. Mechanical engineering is ranked on top, since new types of farms are going to be developed during the next years in order to handle the challenging sea lice problem.

4.6. Collaboration With Other Relevant Actors

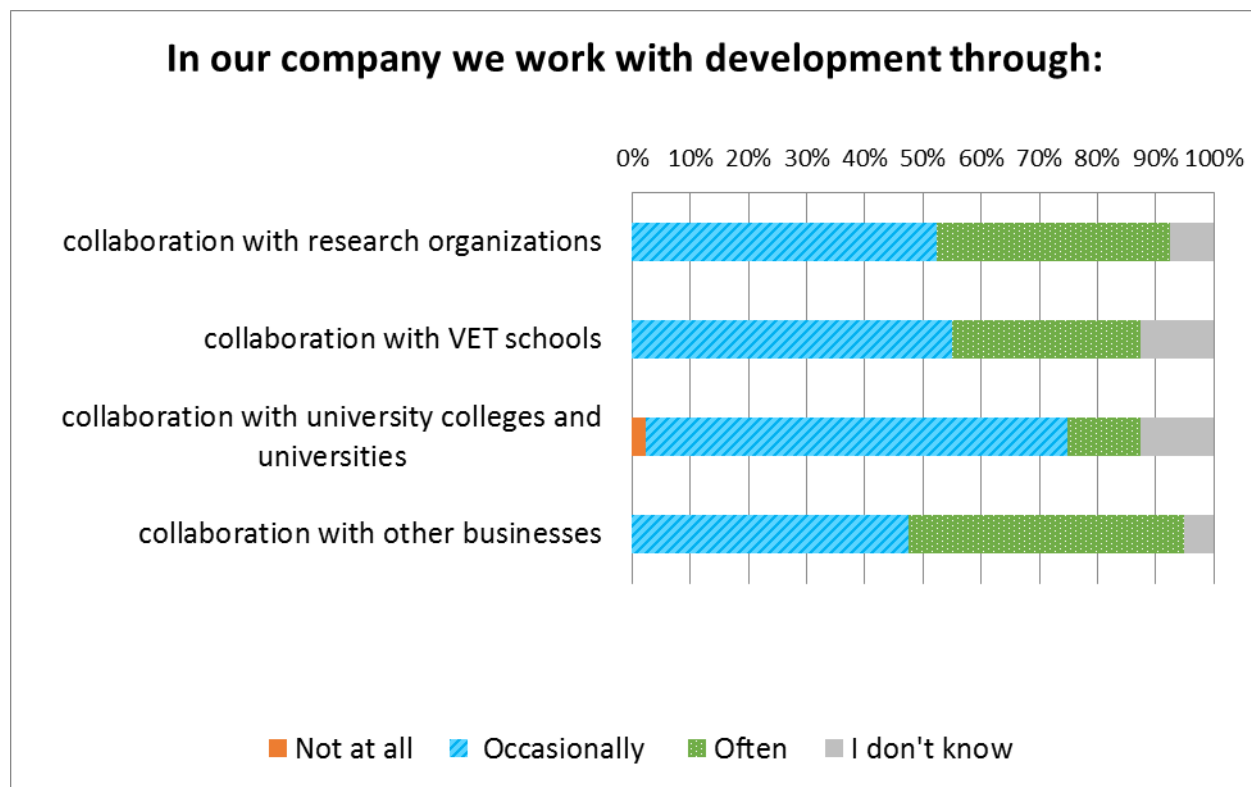


Figure 27: Development through collaboration with other relevant actors

Collaboration and cooperation has been an important factor for the development for fish farming industry in Norway. 40 % of the fish farming companies often cooperate with applied research organizations like for instance SINTEF, in order to pilot innovative solutions. 1 out of 3 companies often cooperate with high schools offering VET training within aquaculture. This includes offering practice for the aquaculture students. However, only 12,5 % often collaborates with universities in order to carry out basic research activities. This shows that the fish farming industry is much stronger on carrying out applied research tasks compared to setting up long term research programs involving PhD students from universities. 48% of the companies mention that they collaborate with other fish farming companies in order to carry out developments, despite that they are competitors on the same market when selling their fish.

Thus, the in company development in fish farming industry in Mid-Norway is driven by strong collaboration between companies and the research environment. The companies choose to collaborate with each other even though they are competing on the same market when selling their products. In addition they support the aquaculture VET schools by offering students access to practice and training involving modern equipment.

New aquaculture VET programs may support this by addressing the importance of development at several levels, including formal and informal meeting places where staff in the fish farming companies meets teachers and students as often as possible. This includes for instance offering practice to students and let students train on work operations they will meet when they start working in the companies.

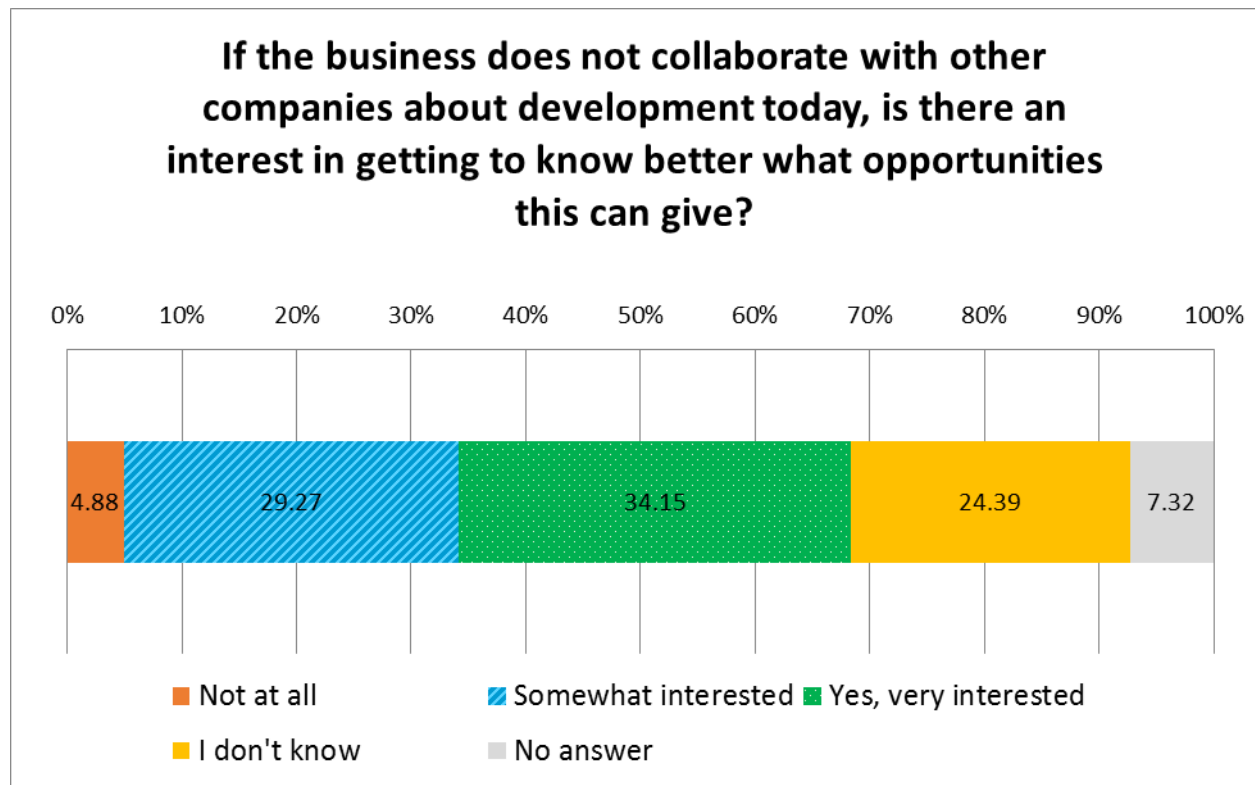


Figure 28: Interest in collaboration with companies

One out of three companies is very interested in collaboration with other companies, while almost the same share is somewhat interested. This shows that the managers still believe there is still a potential for improving the collaboration among the fish farming companies, despite Figure 27 shows that there is already an extensive collaboration ongoing.

A modernized aquaculture VET program could be designed to help facilitating new types of collaboration within the fish farming industry. The potential is large, when 63% reports that they are very interested or somewhat interested. A new aquaculture pilot could be designed to stimulate collaboration, by applying tasks and cases where people from different companies may work together in order to figure out the solutions to the problems or investigate common challenges for development.

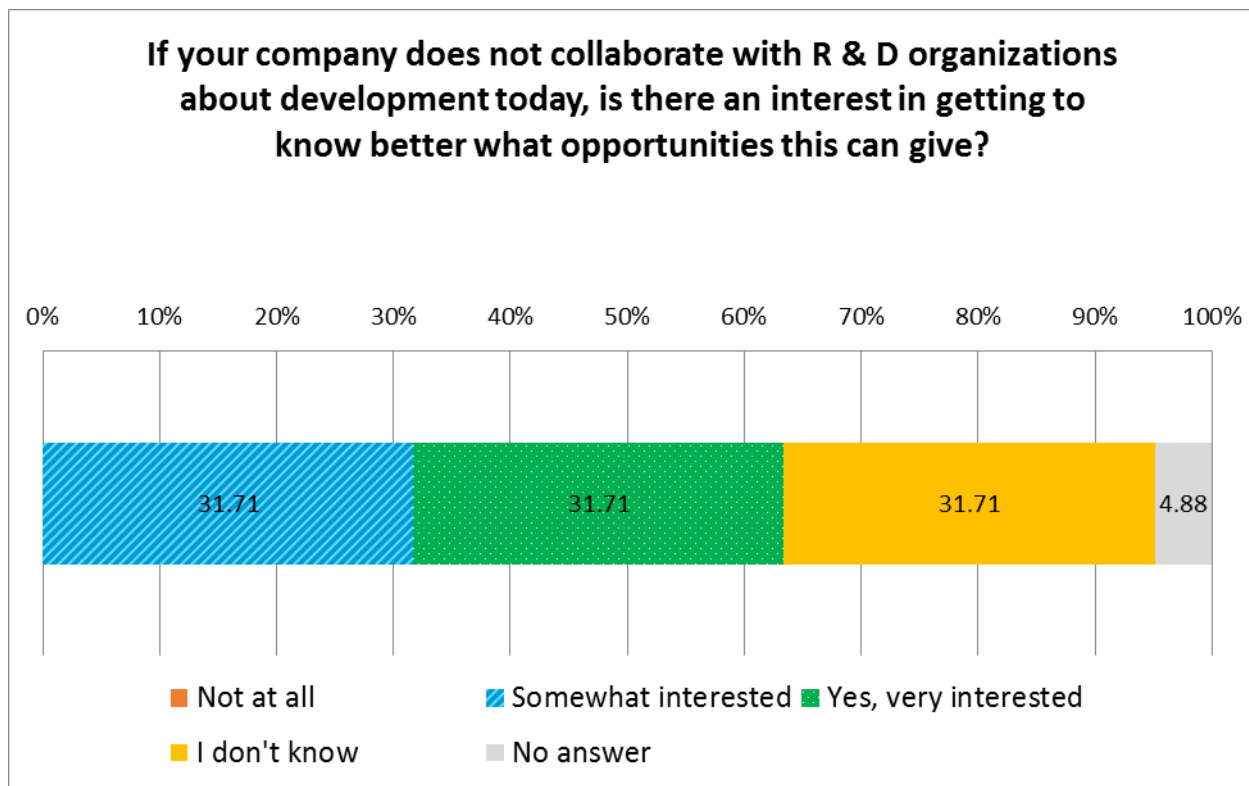


Figure 29: Interest in collaboration with research and development

The managers in the fish farming companies are very interested in getting information and new opportunities for establishing new collaboration with R&D institutions. 32% are very interested, while the same number of managers is somewhat interested. Figure 27 showed that 40% of the companies already had ongoing research collaboration with research organizations. However, those working at the manager level out on the farms or in the processing factories, mentioned that these processes could have been enhanced further. This indicates that there are many unresolved issues, task, problems at a regional and local level etc. within the aquaculture industry that needs to be solved by R&D.

Fish farming industry in Norway is still a young industry, starting approximately 40 years ago. Older and more mature industries in Norway invest a higher share of their turnover in research, compared to the fish farming industry. New aquaculture VET programs may try to address the importance of investing in R&D in order to get progress in research and development within the industry.

Area 5: Conditions: locally - nationally – internationally

The last area of questioning refers to factors that might influence the company or the industry during a horizon of 3 to 5 years.

5.1. Conditions Influencing the Company

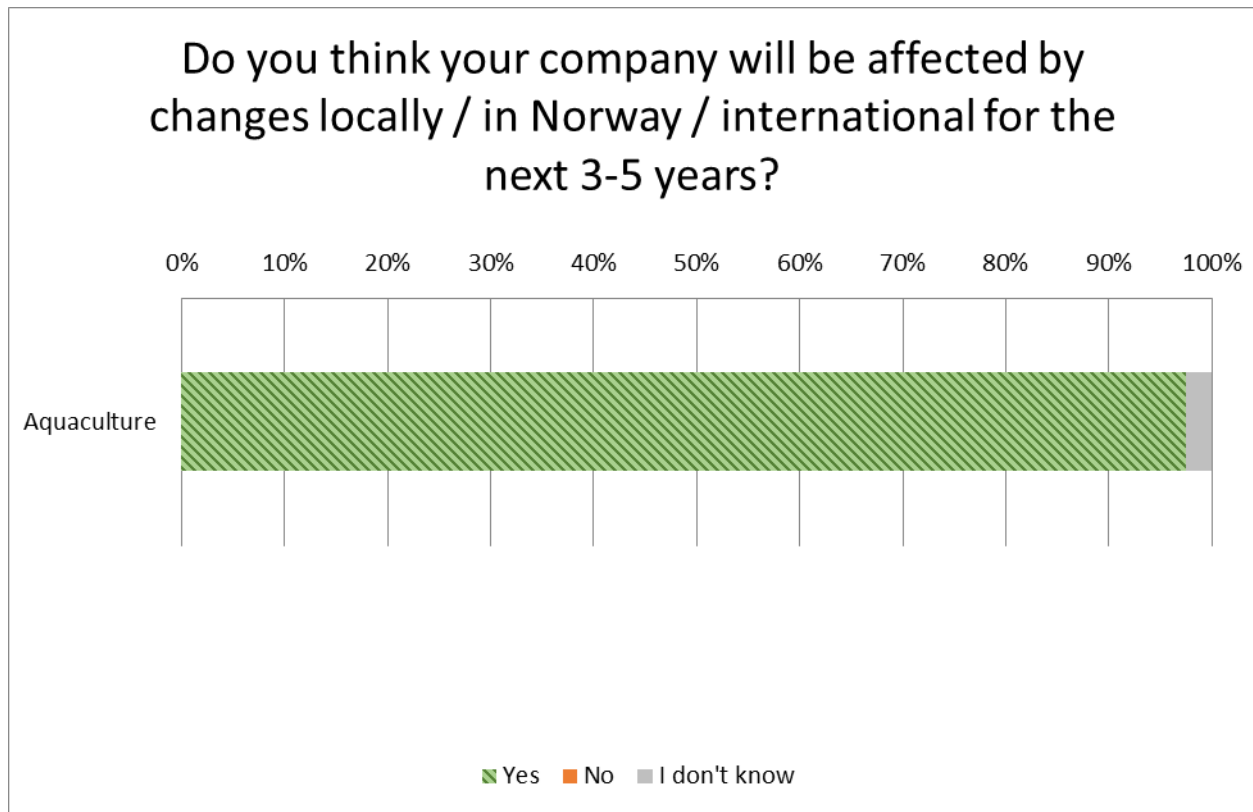


Figure 30: Perceived influence upon fish farming company

There is an overwhelming agreement that each company will be influenced by external changes during the next 3 to 5 years. The companies expect that the production and processing of farmed fish will change during this period due to technical development and legislations etc.

New aquaculture VET programs will be challenged by these changes. It will be necessary to update parts of such training programs frequently.

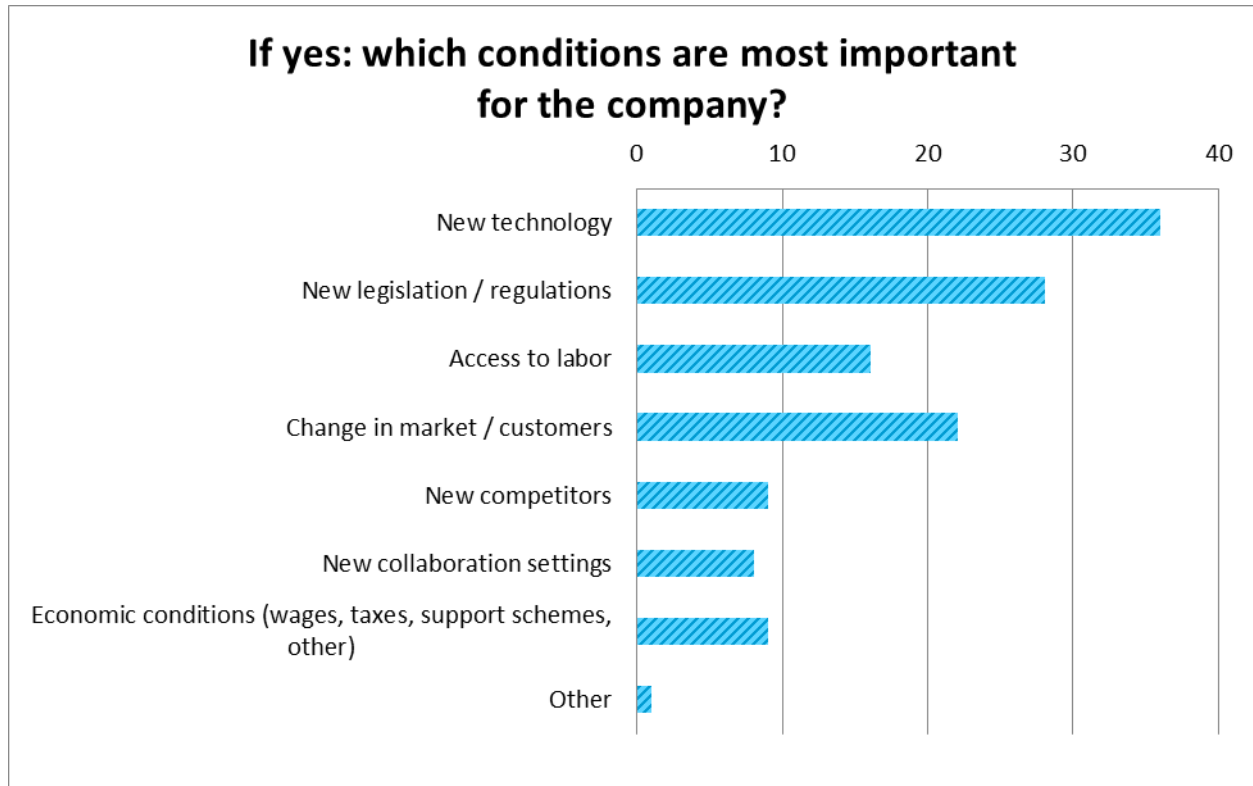


Figure 31: Factors influencing company on short term

The most important factors influencing a company, as pointed out by the managers, are access to new technology; changes including new legislations, changes in the external market and access to labor forces (88%, 68%, 54% and 39% respectively). One single manager mentioned as an additional new factor the “management authorities” and the regulations they may define.

For a modern aquaculture VET course program, the consequences are that it must continuously update the content such that it reflects the technology that the farming companies apply. Since production of digital content and learning material are expensive, one way could be to develop some material in each country and then share it between the countries cage farming salmon.

A modern aquaculture VET course program must include the latest updated national regulations. It may be tricky to share those between several countries, unless the European Commission harmonizes them. Such a program will, however, directly contribute to increasing the access to labor that has national recognized aquaculture qualifications.

5.2. Conditions Influencing the Industry

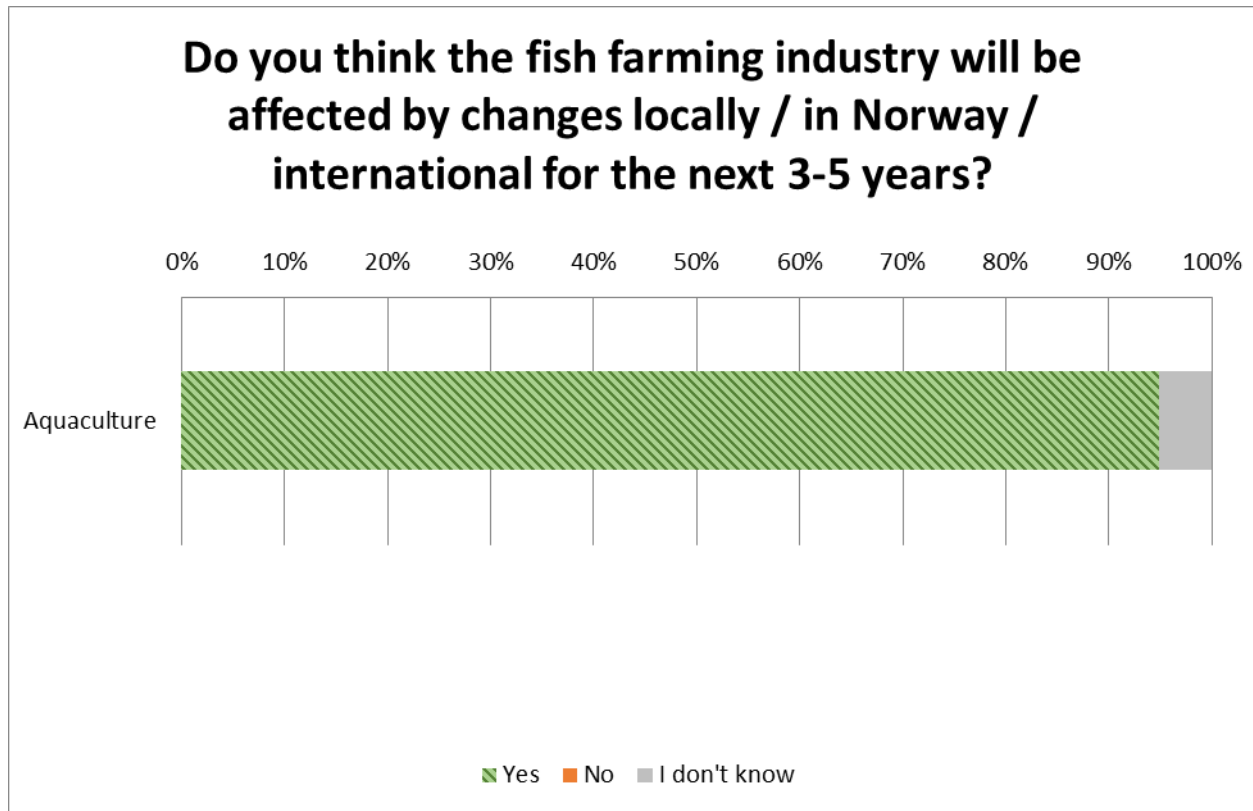


Figure 32: Perceived influence upon aquaculture industry

There is overwhelming agreement that the fish farming industry sector will be influenced by external changes during the next 3 to 5 years. The response rate is at the same level as it was for the fish farming companies in figure 30.

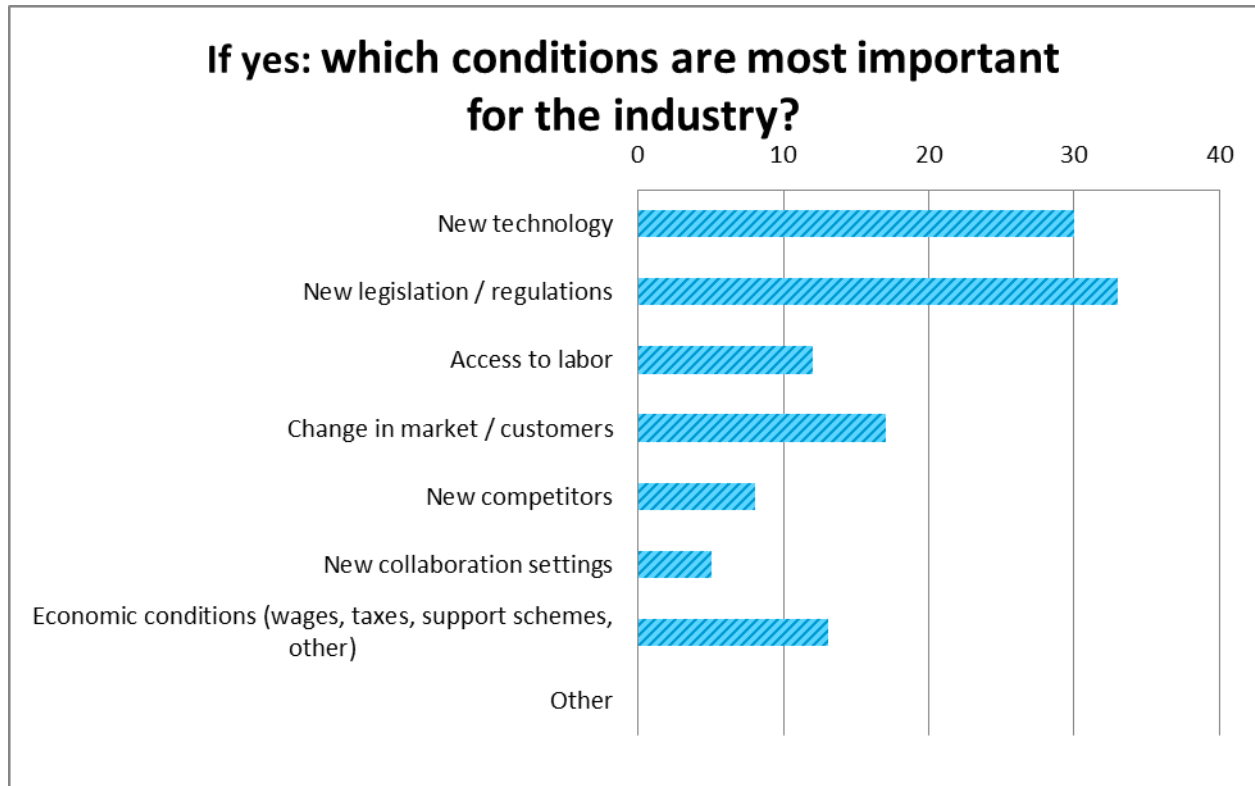


Figure 33: Factors influencing industry on short term

The factors, which can generate change in the aquaculture industry, are somewhat similar in the distribution to the ones regarding the companies in figure 31. The most important factor is now seen to be legislation followed by technology and then changes in market/customers and access to labor (80.5%, 73%, 41.5% and 30% respectively).

Since legislations and regulations is considered to be the most important point for the industry, modern aquaculture VET courses should provide in depth knowledge about these aspects.

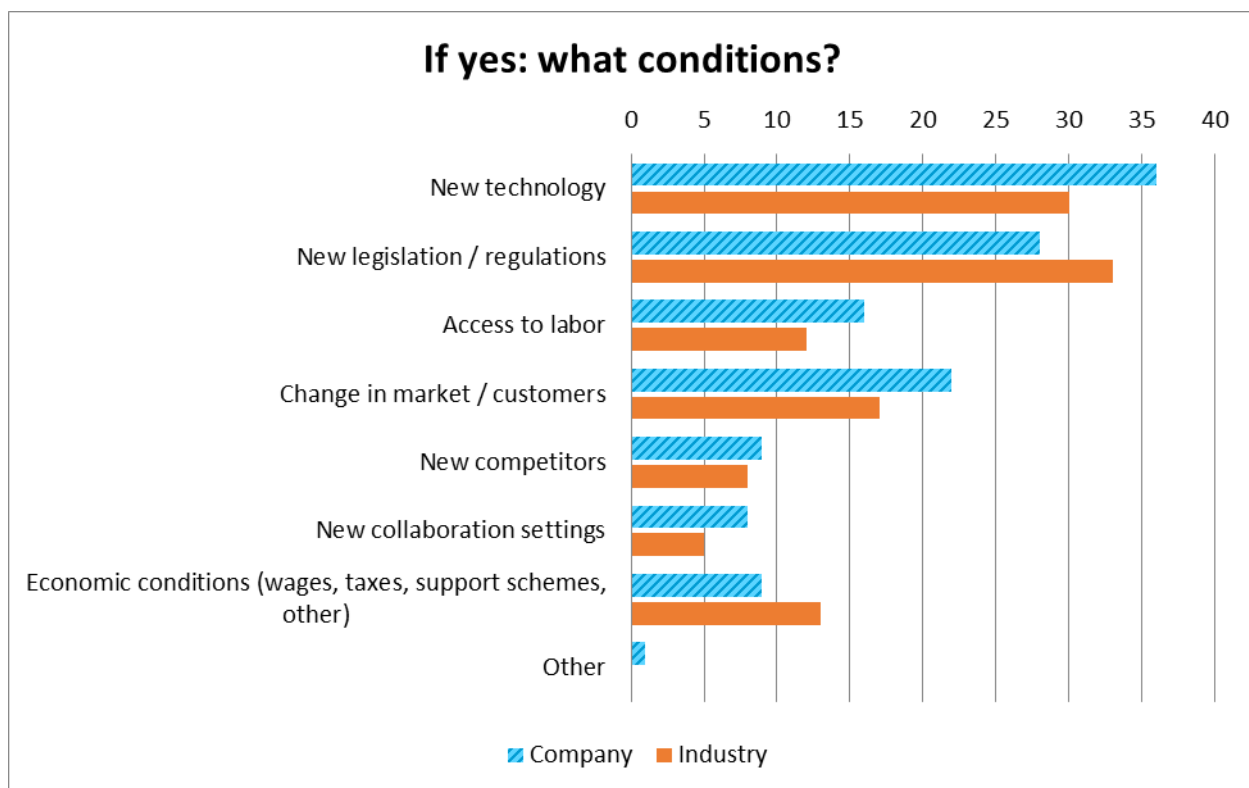


Figure 34: Factors influencing the company / industry side by side

If we compare the data in the same table, figure 34, we notice that the managers perceive that the company will be influenced by new technology to a larger extent than the fish farming industry itself. However, they perceive the opposite with respect to new legislation and regulations. That is, a smaller number of managers believe that legislation is a factor of change in company than the industry.

For a modern aquaculture VET program, the consequences may be that is necessary to offer adapted training to various types of stakeholders, e.g. fish husbandry or site managers. This training, however, may be delivered with eLearning.

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1. *Kartlegging av behov for kompetanse og arbeidskraft i sjømatnæringen*, SINTEF report, 6.8.2014, ISBN 978-82-12-05757-7

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