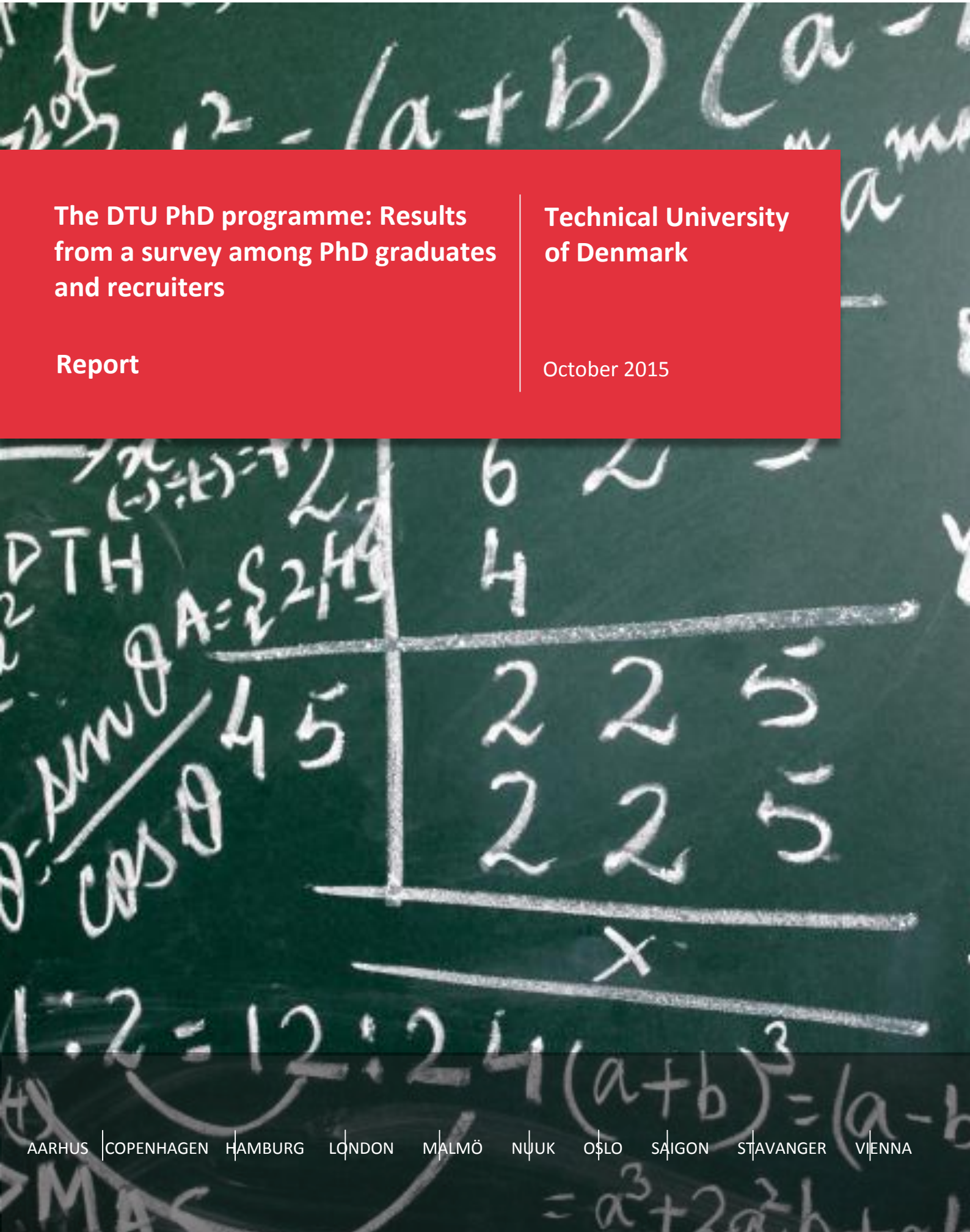
EPINION



The DTU PhD programme: Results from a survey among PhD graduates and recruiters

Report

Technical University of Denmark

October 2015

Contents

1. INTRODUCTION

As one of Europe's leading technical universities, Technical University of Denmark (DTU) constantly focuses on ensuring the high quality and relevance of its study programmes. This of course also applies to the PhD programme with the number of enrolled PhD students increasing to approximately 1,500 in 2015.

DTU has commissioned this survey of PhD graduates and recruiters in order to ensure the high quality and positive development of its PhD programme. The survey has been designed to be comparable with an earlier survey conducted among graduates from the Master's (MSc) programmes. The aim of the survey is to develop the PhD programme and thus facilitate the researchers' transition to the labour market.

The results of the survey are based on a quantitative web-based questionnaire sent to graduates from the PhD programme at DTU from 2010 to 2014. Full answers were obtained from 644 graduates, which make it up for 44% of the total population of 1,456 graduates. When examining background characteristics the representation of the obtained data is highly satisfactory although Danish graduates are slightly over-represented at the expense of graduates of other nationalities. Most of the graduates were invited by email and in a few cases by a postal invitation letter.

Table 1. Summary of population and obtainment. Gender, graduation year and nationality.

Background characteristics	*Population*	*Population (pct.)*	*Obtainment*	*Obtainment (pct.)*
Gender				
Man	1,003	69	447	69
Woman	453	31	197	31
Total	*1,456*	*100*	*644*	*100*
PhD graduation year				
2010	241	17	131	20
2011	274	19	113	18
2012	299	21	121	19
2013	320	22	128	20
2014	322	22	151	23
Total	*1,456*	*100*	*644*	*100*
Nationality				
Danish	769	53	391	61
Other	687	47	253	39
Total	*1,456*	*100*	*644*	*100*

Source: Epinion for DTU—Graduate Survey, 2015

In addition to the survey, a study of employers of PhD graduates was conducted. In this study, 44 companies who recruit graduates from DTU have taken part in qualitative telephone interviews.

1.1 READING GUIDE

In **Chapter 2**, the main results are summarized from the quantitative survey of graduates and the qualitative survey among recruiting companies. **Chapter 3** describes the employment situation for graduates, covering for instance the type of business, work functions, job typologies, and what graduates associate with a good job. **Chapter 4** looks at the graduates' transition to the labour market—their job considerations while studying, job seeking, the first job, and the recruiting companies' view of the transition. **Chapter 5** addresses questions about the competencies acquired by graduates during their studies and the relevance of their competencies. **Chapter 6** discusses the international dimension of the programmes, such as research visits abroad and international networks. **Chapter 7** describes the PhD students' use of career guidance, coaching and leave, and their suggestions for further development of the programme. **Chapter 8** discusses participation by graduates in continuing education courses or supplementary training and how they experience the need for it and its value. **Chapter 9** describes how the graduates experience the competencies they have acquired in relation to innovation, entrepreneurship, and setting up in business for themselves, and whether they have developed technology, software, etc. which have been patented. Finally, an account of the qualitative and quantitative methods is provided in **Chapter 10**. The questionnaire used and the interview guide for the qualitative interviews are attached as **Appendix 1** and **2**.

The report shows the main results of the quantitative survey in the form of figures while some additional results are only mentioned in the text. The figures show the results as percentages, i.e. shares of the graduates or the respective subgroups of the graduates. In some cases, the figures may sum to more than 100% due to the respondents' opportunity to provide more answers to the questions. Generally, all percentages are rounded so they are displayed without decimals. This means that the rounded percentages in the figures and text may sum to more or less than 100%.

1.2 ORGANIZATION OF PHD STUDIES IN DENMARK

In Denmark only universities can confer the doctoral degree. We have a legal framework for doctoral education (the Ministerial Order on the PhD Programme) which all universities must follow. The PhD study programme corresponds to three years of full-time studies and includes:

- Completing an independent, scientific project
- A PhD study programme (courses equivalent to 30 ECTS points)
- Teaching and dissemination of knowledge
- An external research stay

The PhD degree is awarded in recognition of the recipient having completed a PhD programme as well as having defended a thesis in a satisfactory way. The PhD graduate has documented a capacity to carry out a scientific project involving independent application of the relevant scientific methodology, thereby displaying a research effort at a level corresponding to international standards of PhD degrees within the specific field. Read more at dtu.dk/phd_uk

2. SUMMARY OF MAIN RESULTS

This chapter summarizes the main results of the questionnaire survey among all PhD graduates from 2010 to 2014 and the qualitative study among recruiting companies.

Employment after a PhD programme at DTU

Among the graduates who answered the questionnaire, 94% are currently employed, another 1% are self-employed with own company, and 4% are unemployed. Considering that the graduates in this survey completed their PhDs in a period of economic recession, and that the survey was conducted not long after the graduates completed their PhDs, this must be regarded as a low level of unemployment.

Half of the employed graduates are working in the private sector, and more than one in three are employed at a university or a similar research institution. A large number of graduates find employment in either research or production, which includes companies in chemical or biotechnological industries. In addition, there is a considerable predominance of graduates employed in large companies and organizations with more than 1,000 employees, and at workplaces in the Capital Region of Denmark. The majority of graduates are occupied with research assignments.

In general, most graduates give priority to meeting professional challenges in their work, but a suitable work-life balance is also an important quality for most of them.

Transition to the labour market

The great majority make a smooth transition from a PhD programme to the labour market, and most graduates quickly find employment. In fact, 74% have already found jobs before they complete their PhD programme. Slightly more than half of the graduates find their first job at a university and almost three out of four work on research assignments in their first jobs after completing their theses.

The majority of graduates find their first job through their personal or professional networks, but there are also many who are appointed after submitting an application—whether invited or unsolicited. Many believe that, in particular, the specialized competencies they have acquired have played an important part in their first employment.

Similarly, the recruiting companies do not generally face many challenges in the graduates' transition from study programmes to the labour market. From an employer's point of view, the challenges are no different from those connected with the transition for all newly qualified employees. The companies who primarily recruit engineering generalists and specialists experience slightly greater challenges in the transition than the companies who primarily recruit generalists and specialists in research fields. In the companies where the graduates are not primarily working on research assignments, they may for instance need to

learn to work with customer interaction and project management, and observe shorter and stricter deadlines.

The match between required and acquired competencies

The great majority of graduates feel well equipped for the labour market. More than half of the graduates believe that their PhD programme to a large extent has prepared them for their present job, and a further third of them believe that this is to some extent the case. The great majority of graduates also make use of the competencies they have acquired during their PhD programme, and only 4% answer that there is no professional link at all between their PhD and their first job. Slightly more than half of the graduates believe that a PhD was required for their first job after submitting their thesis.

In general, the survey is of a match between the competencies acquired by the PhD students and those required by the recruiting companies. Thus, for most competencies the survey shows a correlation between the degree of which the graduates consider to have acquired a competence and the degree of which the graduates consider the same competence to be relevant to the labour marked. This can also be seen from the fact that the recruiting companies generally believe that the competencies they need are matched by the PhD graduates' profiles, and that the great majority of graduates assess the programme positively with regard to acquisition and relevance of professional engineering competencies.

At the same time, the PhD programme equips graduates to a greater degree for future work in universities and research institutions than in other public or private businesses. Graduates who believe that their studies have prepared them for their present jobs are to a very great extent those employed at universities. Furthermore, graduates employed outside universities consider to a significantly greater degree than university employees that they have acquired competencies that are not particularly relevant to performing their jobs so far.

Slightly under a quarter of the graduates pointed out one or several competencies that they think should have been included to a greater extent in the PhD programme. Among these, a large number pointed especially to a lack of competencies in project management, entrepreneurship, and innovation, applying for funds, communications and presentation techniques, or in relation to collaboration and networks.

The recruiting companies employ PhD graduates in specialist roles more often than in generalist roles. It is not surprising, therefore, that well-developed professional competencies are the most essential to recruiters. Supporting competencies are also important to companies especially interested in engineering expertise, while these competencies are less important when companies are primarily interested in research skills. The professional expertise sought is so specific in some cases that it is not possible to match the needs of the companies. Typically, companies that employ graduates in specialist

functions attach great importance to the subject of the thesis, while the subject is of no particular importance to companies who employ generalists in engineering or research.

Collaboration with trade and industry

In connection with their PhD projects, 43% of graduates have collaborated with trade or industry. However, the degree of collaboration varies considerably between the different fields of study. Commercial collaboration is one of the areas where a significant number of graduates find possibilities for developing their PhD programme to equip them better for employment in trade and industry—for instance through better career guidance and closer collaboration with the sector during their studies.

The recruiting companies generally find good possibilities in collaboration with PhD students. Collaboration on a PhD project brings new development and knowledge to the company, enabling it to go in depth in a field for which there would not otherwise be resources or funds. In addition, it can be an advantageous channel for recruitment, where the company can actively make allowances for some of the minor challenges associated with the starting phase, and secure a match between the graduate and the company.

Research visits abroad

Slightly more than half the graduates have studied or conducted research at a different university during their PhD programme. Graduates who have been abroad believe that it has contributed to their development, both professionally and personally. Three out of four graduates state that they have built up an international network in connection with their PhD programme.

The recruiting companies also find that research visits abroad contribute positively to the graduates' development, and in particular maturity, language skills, and understanding of other cultures. A visit abroad for research is particularly important to recruiters looking for high research expertise, since it results in a professional network, to which the recruiter also gains access by employing a PhD graduate.

Supplementary and continuing education

About a quarter of the graduates have completed or are taking continuing education. This refers primarily to short courses, and DTU is the largest provider of continuing education. Slightly less than four out of five graduates believe that continuing education is 'highly important' or 'to some extent important' to enable them to maintain their value on the labour market.

3. THE LABOUR MARKET FOR GRADUATES

This chapter describes the characteristics of the graduates' first employment after obtaining their degree and their current employment with regard to sector, region, the size of the workplace and work functions. The chapter also describes the qualities graduates associate with a good job. Finally, four job typologies are described, resulting from the qualitative interview with recruiting companies.

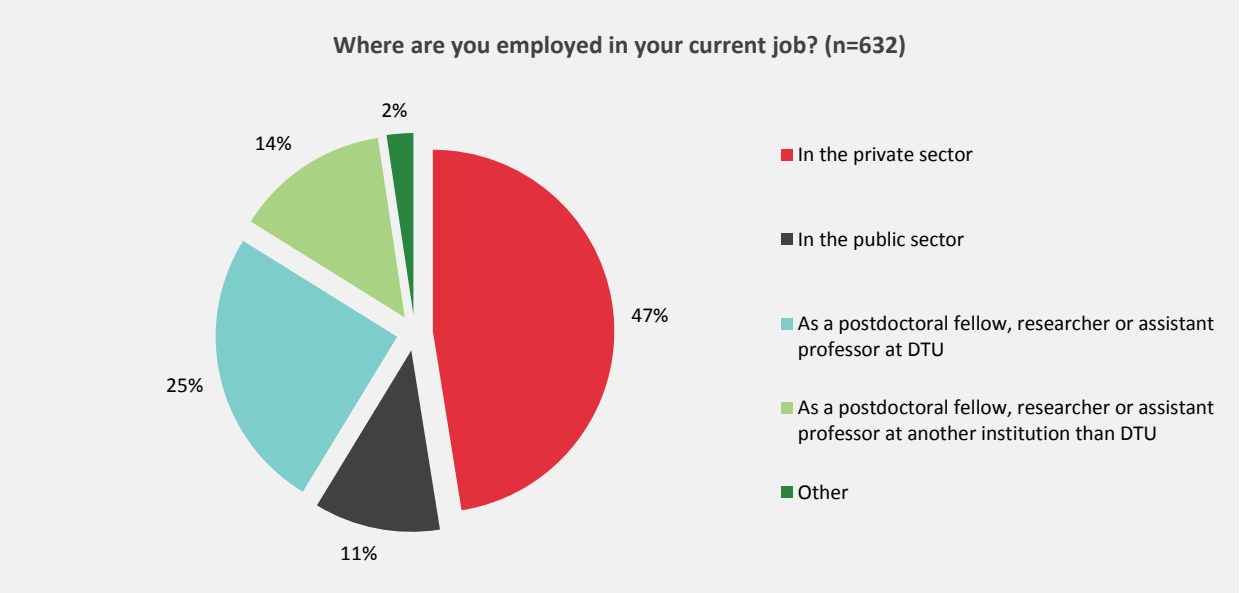
3.1 WHERE ARE GRADUATES EMPLOYED?

The private sector dominates

The unemployment rate among PhD graduates from DTU is fairly low. 94% of the graduates are currently employed, while 4% of are currently unemployed. 1% of the graduates are self-employed and less than 1% are enrolled in a new study programme.

As shown in Figure 1, 47% of the employed PhD graduates are currently employed in the private sector while 11% are currently employed in the public sector. 25% are currently employed as postdoctoral fellows, researchers, or assistant professors at DTU, while 14% are employed as postdoctoral fellows, researchers, or assistant professors at another institution than DTU.

Figure 1: Where are you employed in your current job?



Of the PhD graduates who are employed in the private sector, nearly half (42%) are employed in the businesses of manufacturing including manufacturing within chemical or biotechnological industry. 13% are employed in the businesses of consultancies etc. while 8% are employed within information and communication. The rest employed in the private sector are scattered across various other

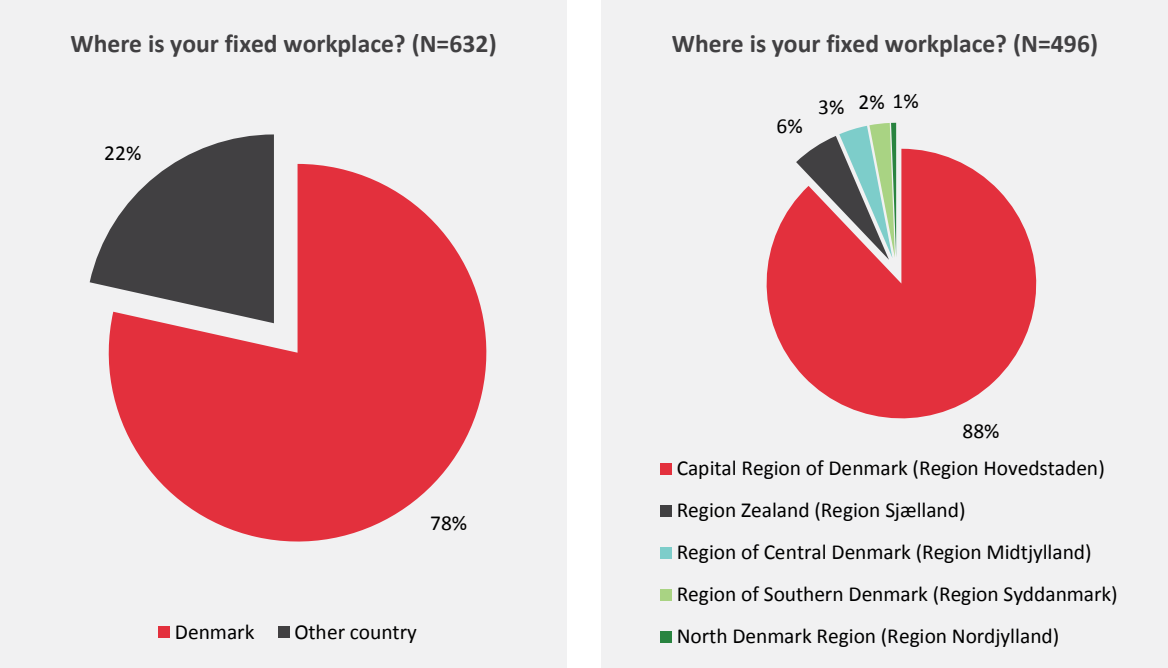
businesses. For instance, 4% are employed within electricity, gas, steam, etc., 3% with construction, 2% with transportation, and 1% within agriculture, forestry and fishery.

When comparing graduates employed in Denmark with graduates employed outside Denmark the only significant difference relates to the proportion employed at a university or research institution. Thus, fewer graduates employed in Denmark than outside Denmark are employed at a university or research institution (respectively 40 % and 58%).

Graduates find work primarily in the Capital Region of Denmark

As shown in Figure 2, about a fifth (22%) of the PhD graduates are currently employed outside Denmark. Graduates employed in Denmark are predominantly employed in the Capital Region of Denmark (88%). 6% are employed in the Region Zealand, 3% in the Central Denmark Region, and 2% in the Region of Southern Denmark. Only 1% of the graduates are employed in The North Denmark Region.

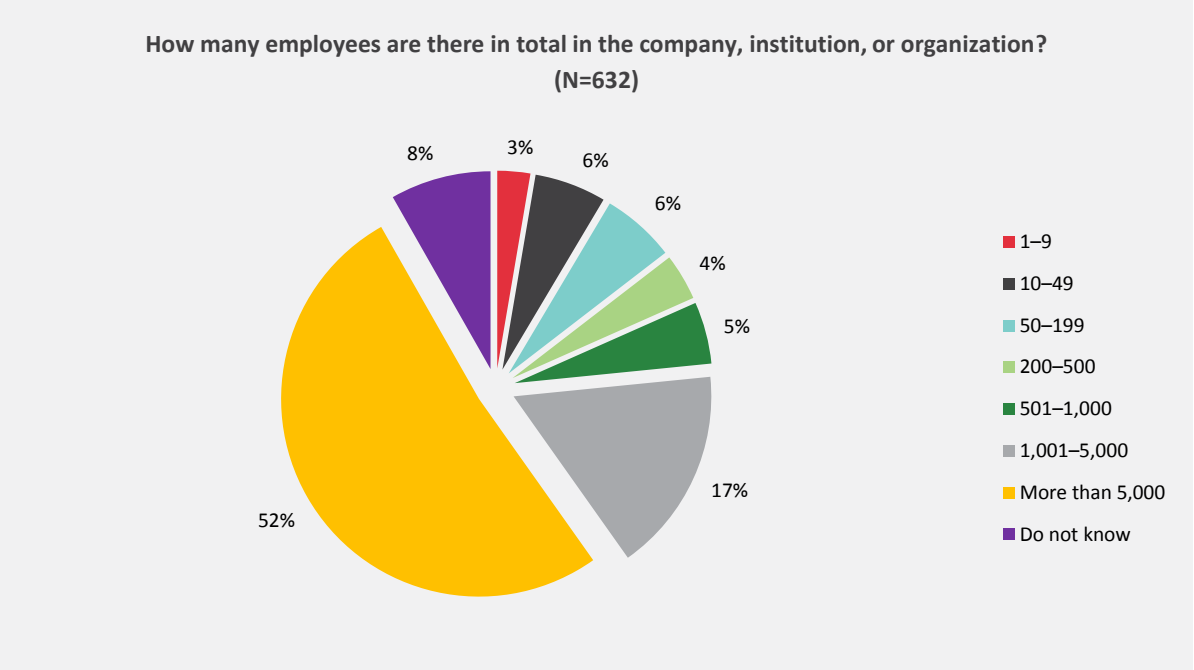
Figure 2: Where is your fixed workplace?



Graduates work primarily in large organizations

More than half (52%) of the PhD graduates are employed in companies, institutions, or organizations with more than 5,000 employees. An additional 17% are employed in companies, institutions, or organizations with 1,001-5,000 employees. Respectively 9% and 15% of the graduates are employed in medium-sized (200-1,000 employees) or small (1-199 employees) companies, institutions, or organizations.

Figure 3: How many employees are there in total in the company, institution, or organization?



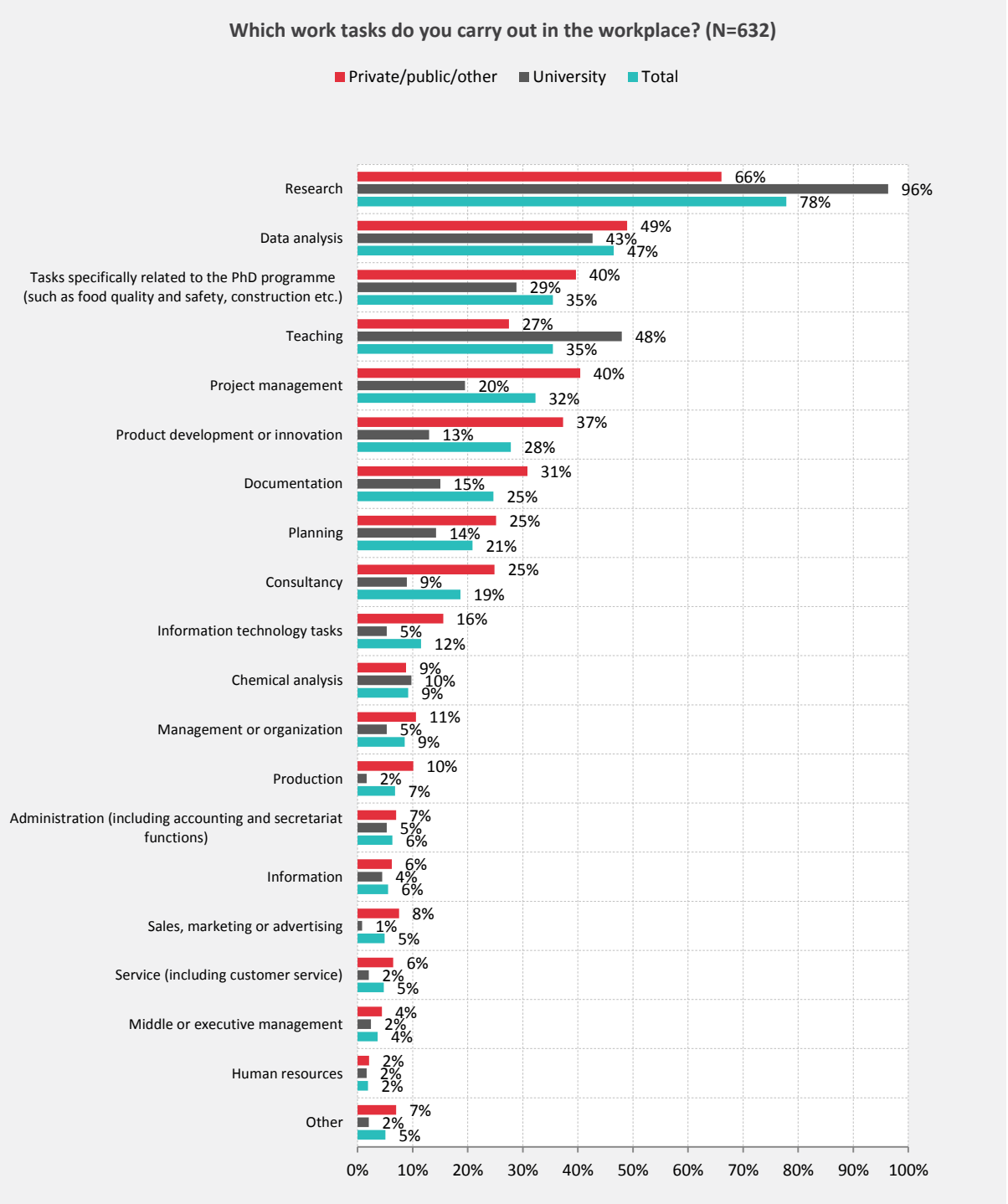
A majority of graduates are engaged in research functions

In the survey, PhD graduates were also asked which tasks they perform in the workplace. As shown in Figure 4, the graduates are engaged in a variety of tasks.

A common factor for a large proportion (78%) of the graduates is that they are engaged in research. Similarly, a large proportion is involved in data analysis (47%), tasks specifically related to their PhD programme (35%), or simply teaching (35%). More than one of four (28%) are engaged in product development or innovation. Besides project management (32%), relatively few graduates carry out tasks that are more general. For example, few work with administration including accounting and secretariat functions (7%), human resources (2%), sales, marketing and advertising (5%), and service, including customer service (5%).

Figure 4 shows the different tasks carried out in the workplace by graduates employed at a university compared to graduates employed in the private, public, or other sector. In comparison, graduates employed at a university conduct research and teaching while graduates employed in the private, public, or other sector perform more varied tasks like product development or innovation and project management.

Figure 4: Which work tasks do you carry out in the workplace?



Note: Percentages add up to more than 100%, since respondents were allowed to give more than one answer.

3.2 WHAT DO GRADUATES ASSOCIATE WITH A GOOD JOB?

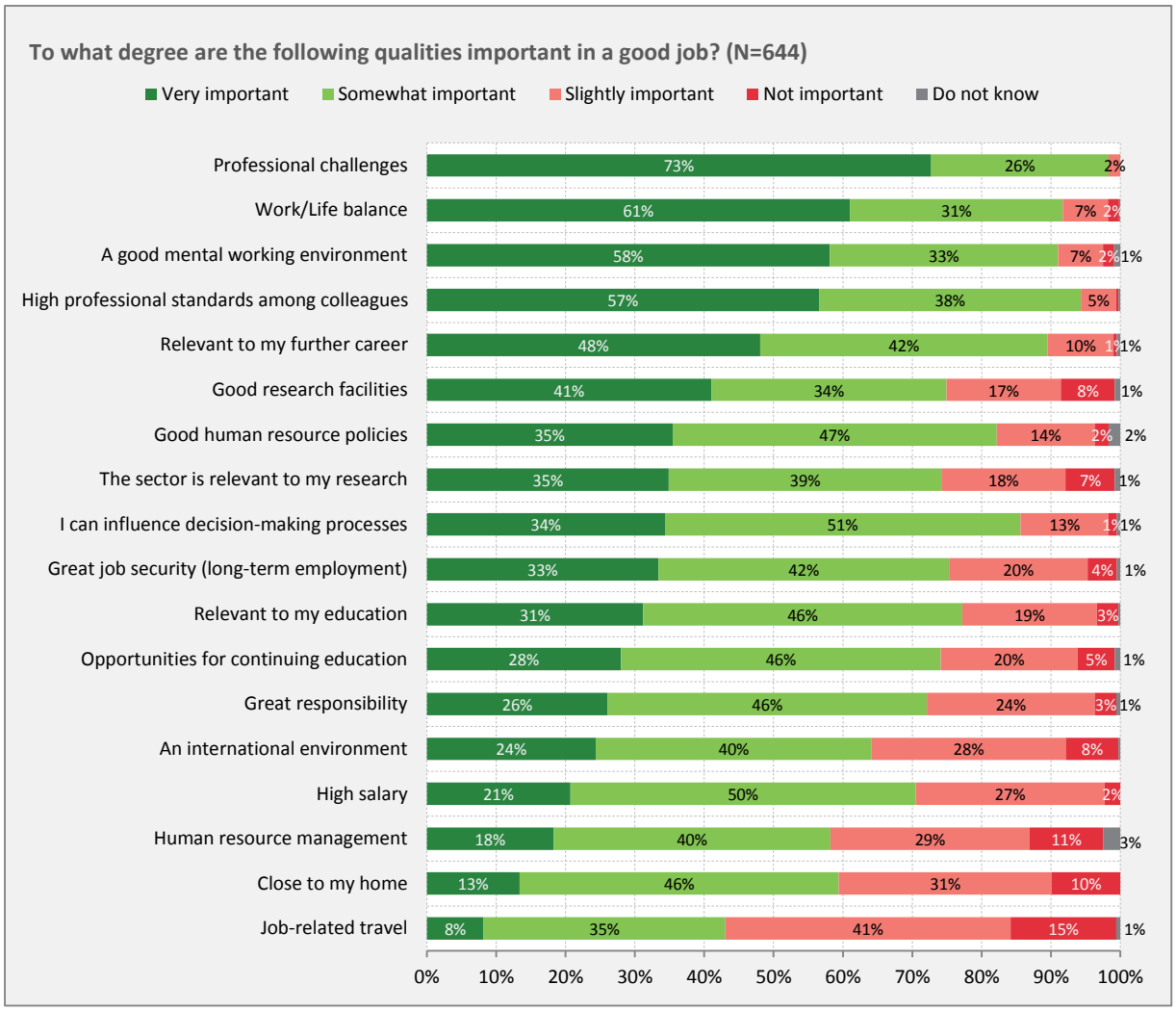
Graduates prefer professional challenges and work/life balance in a job
In addition to examining how and what the graduates are working with, the graduates were also asked which qualities they perceive as important in a good job.

Figure 5 shows that nearly all of the graduates find professional challenges either very important or somewhat important (99%). Similarly, 94% find high professional standards among their colleagues very important or somewhat important.

Graduates do not only find professional challenges and high professional standards among their colleagues important in a good job. The qualities that the second and third largest proportions of the graduates regard as very important in a good job are a good work/life balance (61%) and a good psychological working environment (58%). Nearly half of the graduates also find it very important that the job is relevant to their future career (48%).

Furthermore, most graduates do not regard job-related traveling as an important quality in a good job. Graduates do not rank workplace close to their home, a high salary, great responsibility, job security, and influence on decision-making processes among the most important qualities in a good job either.

Figure 5: To what degree are the following qualities important in a good job?



Graduates have had few different jobs before and after the PhD programme

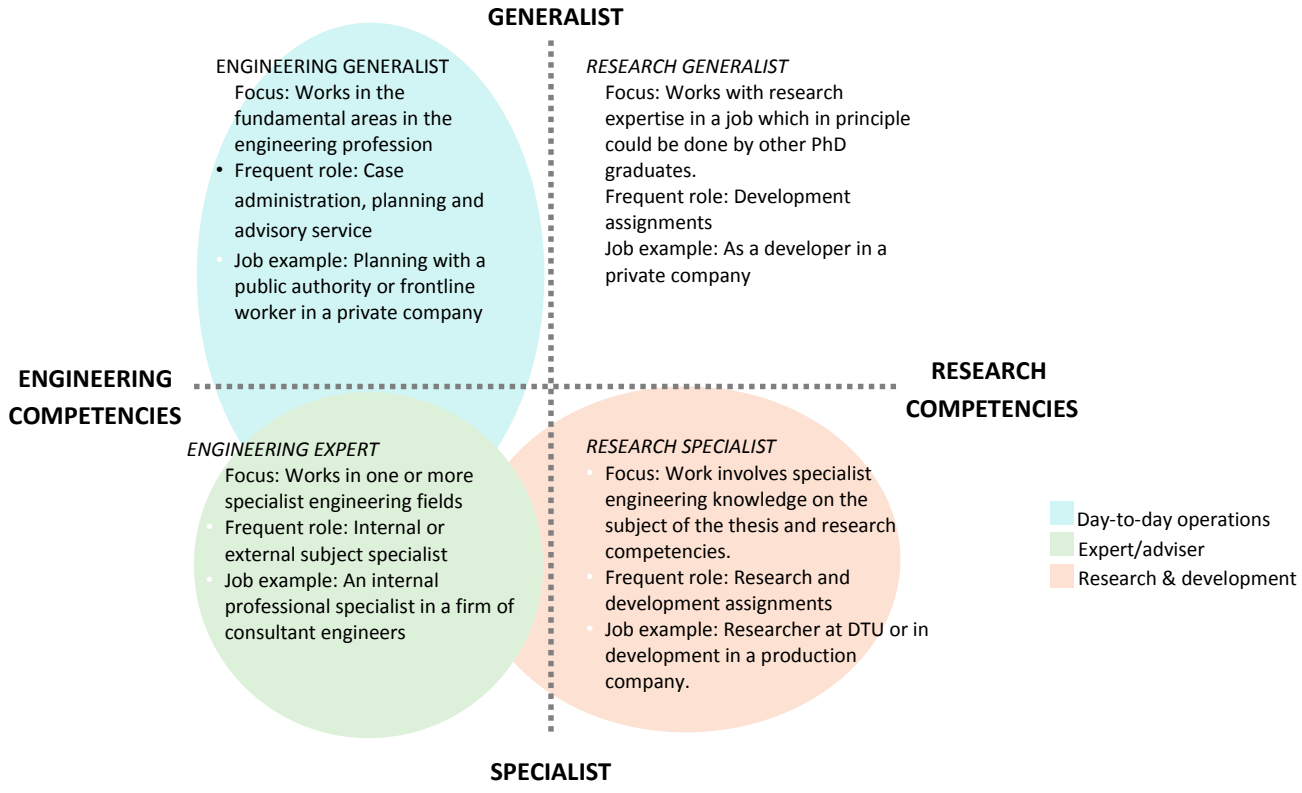
The survey shows that half the PhD graduates have had no (48%) or less than a year (21%) of relevant job experience after receiving their MSc degree, but before beginning their PhD programme. 17% of the graduates had 1-2 years of relevant job experience and 14% of the graduates had three years or more.

Not surprisingly, the majority of graduates have had few different jobs after receiving their PhD degree. 51% have had one job, 31% have had two jobs, and 16% have had three or more jobs. A comparison of year of graduation shows a significant tendency to earlier year groups having had more different jobs than later year groups. 31% of the graduates who completed their PhD programme in 2010 have had three or more jobs compared to only 3% of the graduates who completed their PhD programme in 2014, which is not surprising. Conversely, 72% of the

graduates who completed their PhD programme in 2014 have only had one job compared to 37% of the graduates who completed their PhD programme in 2010.

3.3 INTERVIEWS WITH RECRUITING COMPANIES SHOW FOUR JOB TYPOLOGIES

There are significant differences between the graduates' functions in their jobs and thus the required competencies. The qualitative interviews with recruiting companies show two distinctions which are particularly decisive factors in the graduates' job functions and the companies' requirements for competencies. One is the distinction between expertise as an engineer and as a researcher, and the other is the difference between a generalist role and a specialist role. Each of these two distinctions forms a continuum where it is possible to move between two points. They combine as shown in the figure below.



As can be seen from the figure, this paves the way for four job typologies:

- **Engineering generalist:** The engineering generalist works in the fundamental areas of the profession and will thereby draw on wide engineering knowledge. The subject of the employee's thesis has no great influence on employment. An engineering generalist may work in either a public or a private business and is occupied for instance with case administration, advisory service, and supervision. This could, for example, be PhD graduates

employed with public authorities for case administration and planning, for operational assignments in production companies or as teachers in youth education.

- **Engineering expert:** An engineering expert works in one or several specialized engineering fields that are typically related to the graduate's thesis. Thus, an engineering specialist will often serve as an internal or external specialist in a specified field of engineering. This could, for example, be a specialist in a firm of consultant engineers, advising the firm's project teams across departments on a specific theme.
- **Research generalist:** A research generalist will primarily make use of research skills in a job where the subject area may vary, and the research skills are therefore the primary focus. The subject of the graduate's thesis is of no great importance, since research skills such as the ability to assimilate, apply, and disseminate new knowledge is most essential. A research generalist may for instance be a researcher at a university or employed in a development unit in a private company.
- **Research specialist:** A research specialist builds on fundamental engineering expertise, but it is the research competencies and the subject of the thesis that are particularly important in the graduate's job. A research specialist will typically work with research and development in the same field as his/her thesis, and will thus make use of both specialist engineering knowledge and research competencies. The research specialist could for example be a researcher at DTU or in development in a production company.

However, it is important to emphasize that although these four are the clearest job typologies, each axis functions as a continuum. Thus, job functions may require for instance equal degrees of engineering competencies and research competencies.

In the qualitative interviews with recruiting companies, the continuums above appear to be of greater importance in the recruiting companies' demand for competencies and their evaluation of how the graduates match them than for instance the sector or size of the business. There is a certain connection, however:

- **Size of the business:** In large companies there are generally several different types of jobs. Firstly, a large company, where many professional fields are represented, will have many different specialists and generalists employed. Secondly, a large company will often have employees to carry out day-to-day operations, expert assignments and development assignments. Small companies will rarely look for several different profiles, but they may on the other hand expect that the same employee is to a greater extent able to perform multiple functions.
- **Sector of business:** Some industries overlap considerably with types of jobs. Where PhD graduates are concerned, research institutions are primarily looking for research specialists, while public authorities look for engineering generalists, and consultant engineering firms are interested in engineering specialists. In other industries, different job types are required to a greater degree. As mentioned previously, production companies, for example, employ

both engineering generalists and specialists for day-to-day operations, and research specialists for development assignments.

As can be seen from the survey among graduates, recruiters most often employ PhD graduates in the two specialist functions, while the two generalist functions are not seen so often. This applies especially to the engineering generalist, since many recruiting companies believe that this function can sometimes be filled better by an MSc with work experience.

The subject of the thesis is significant in specialist functions, but not in generalist functions

From the qualitative interviews with recruiting companies, it is evident that there is a great difference in how much influence the subject of the PhD graduate's thesis has on employment opportunities. About half of the interviewed recruiting companies state that the subject of the thesis does not have any great significance, while it is of great importance to the other half. On the basis of the four job typologies introduced in the previous section, it can be seen that the greater the degree of specialization, the more importance the subject of the thesis will have for the appointment. This means that businesses that employ generalists in engineering or research do not believe that the subject of the thesis is of any great importance. As one recruiter expressed it: *"We do not often look for PhD graduates in a particular subject field. It is more important that they have the right analytical and methodical competencies than precisely what knowledge they possess."* (Major recruiter in the building and construction sector.)

In contrast, recruiters who employ engineering or research specialists attach great importance to the subject of the thesis, since the thesis serves to a great extent as a guarantee that the graduate possesses the relevant specialist knowledge. As a recruiter explains: *"The people we employ have written a thesis on what we are concerned with. I do not employ anyone who is in a completely different place from where we are."* (Major recruiter from the production industry).

In this connection, however, a number of companies find that there are no PhD graduates with optimal specializations in precisely the company's specific field. In consequence, even though they employ a PhD graduate in a specialist position, they appoint someone who needs to specialize further after the appointment. In these cases, the guarantee that the graduate possesses the necessary professional expertise lies more in the fact that the applicant has actually gained a PhD in a related field. However, recruiters usually employ the graduate whose specialization is closest to that required.

Preferences for educational institutions

The interviews do not indicate that recruiting companies have any strong preferences for which educational institutions PhD graduates have studied at. In general, however, they have a particularly positive regard for DTU and Aalborg University (AAU). One or two point out that DTU has a broader palette with regard to specialist fields, while AAU stands out for good understanding of projects.

A number of recruiting companies emphasize that the engineering profession is a distinctly international labour market, where the language is English, the study programmes are, to a large extent, comparable, and the demands for competencies in the national labour markets are largely

similar. This means that PhD graduates from abroad and international PhD graduates from Danish universities can in many cases fulfil the same job functions as Danes having a PhD, and that many businesses are also oriented towards other countries when they employ engineers and PhD graduates. A number of the recruiting companies therefore employ foreign PhD graduates to the same extent as Danes.

4. TRANSITION TO THE LABOUR MARKET

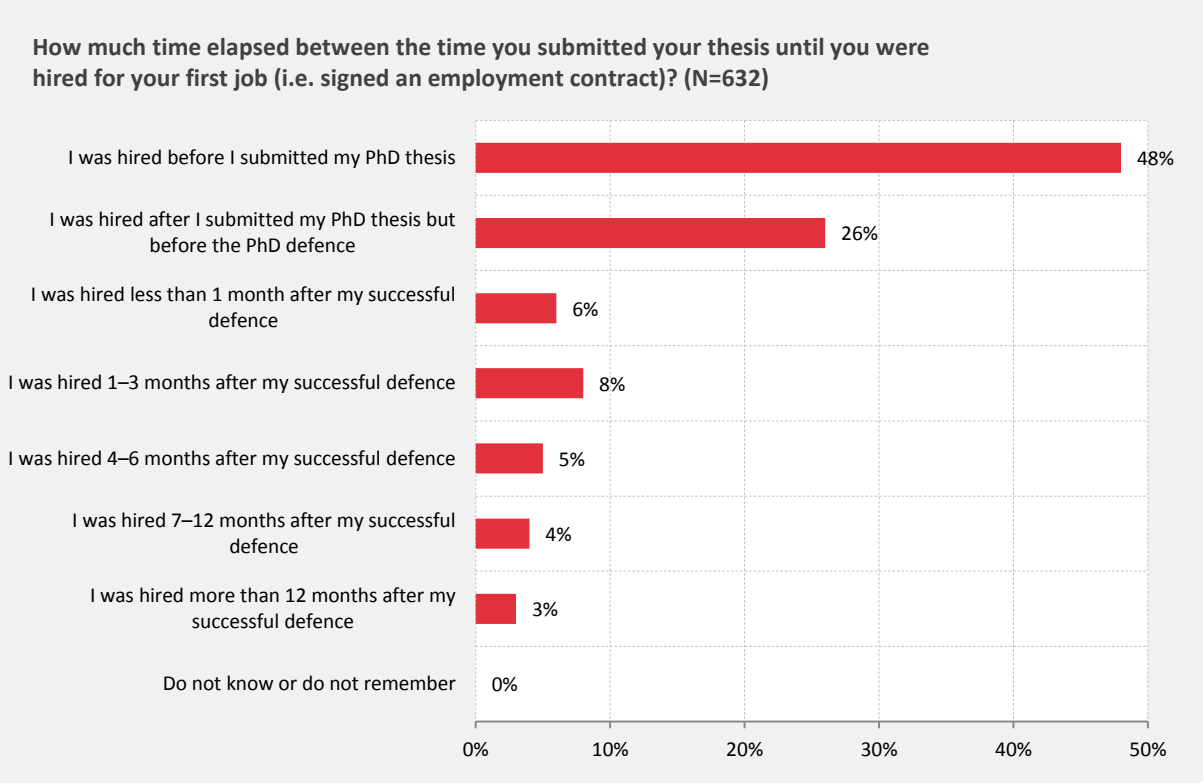
This chapter examines the graduates' transition to the labour market. It is examined how they get their first job, within which sector, and which factors were the most decisive in getting the first job. The graduates' considerations before, during, and after graduation are also analysed. Finally, the chapter describes the views of the recruiting companies on the graduates' transition to the labour market.

4.1 JOB SEEKING AND EMPLOYMENT

There is a high demand for the graduates and few are unemployed

In general, the graduates' transition to the labour market is relatively easy. 74% of the graduates where hired before defending their PhD thesis, and only 3% waited more than one year before signing their first employment contract.

Figure 6: How much time elapsed between the time you submitted your thesis until you were hired for your first job (i.e. signed an employment contract)?



Part of the reason for the short time elapsed between graduation and signing a contract is probably the fact that the graduates in general seek jobs early. 48% of the graduates applied for a job before they submitted their PhD thesis, and a further 14% applied for a job after submitting their thesis, but before defending it. Only 3% did not apply for a job until more than three months after their

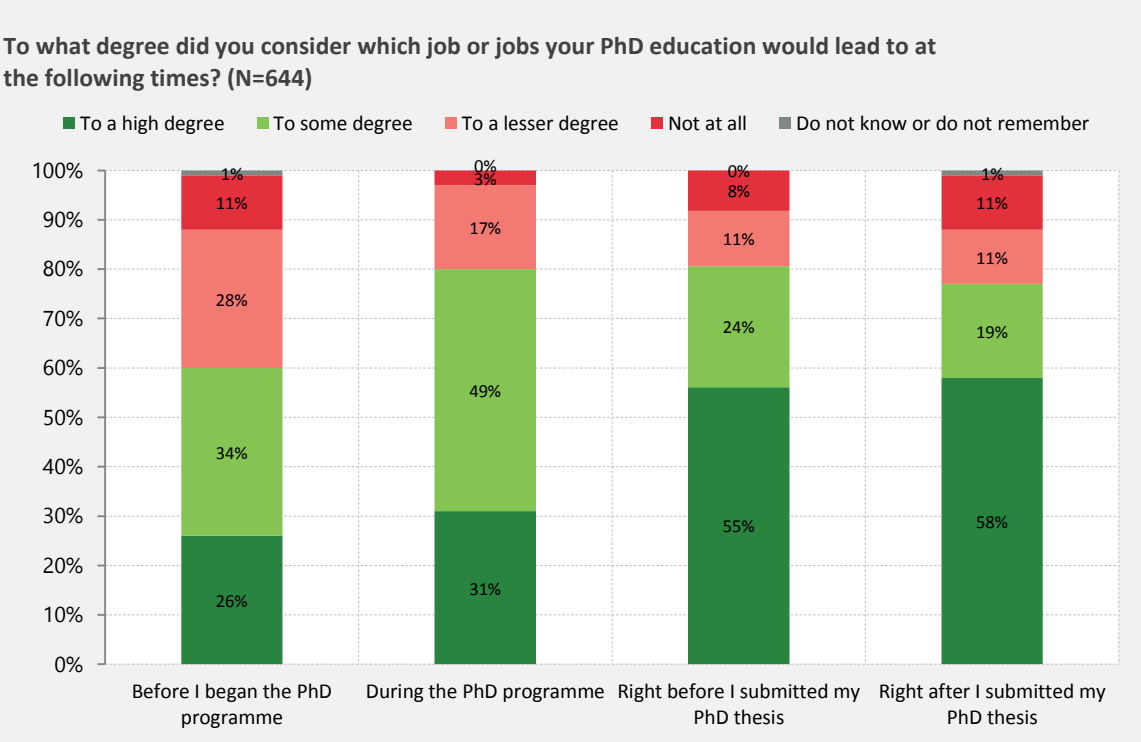
defence. Additionally, there is a proportion of 29%, who did not apply for a job at all. In most of these cases, the reason is that graduates were headhunted for a job while others set up their own business, continued at the same workplace (for example, in continuation of an Industrial PhD), started on a new study programme, or are not yet actively seeking employment.

4.2 JOB CONSIDERATIONS DURING THE PHD PROGRAMME

Job considerations have no major impact on the PhD

Most graduates think seriously about what use they can make of their PhD. Not surprisingly, the number of students considering seriously where their PhD will lead them increases as they approach the end of the programme. Before they start on their PhD, 26% are to a high degree considering which job the PhD education would lead to. Along the way, this applies to 31%. Just before the thesis is submitted, the figure rises to 55%, and after submission to 58%.

Figure 7: To what degree did you consider which job or jobs your PhD education would lead to at the following times?



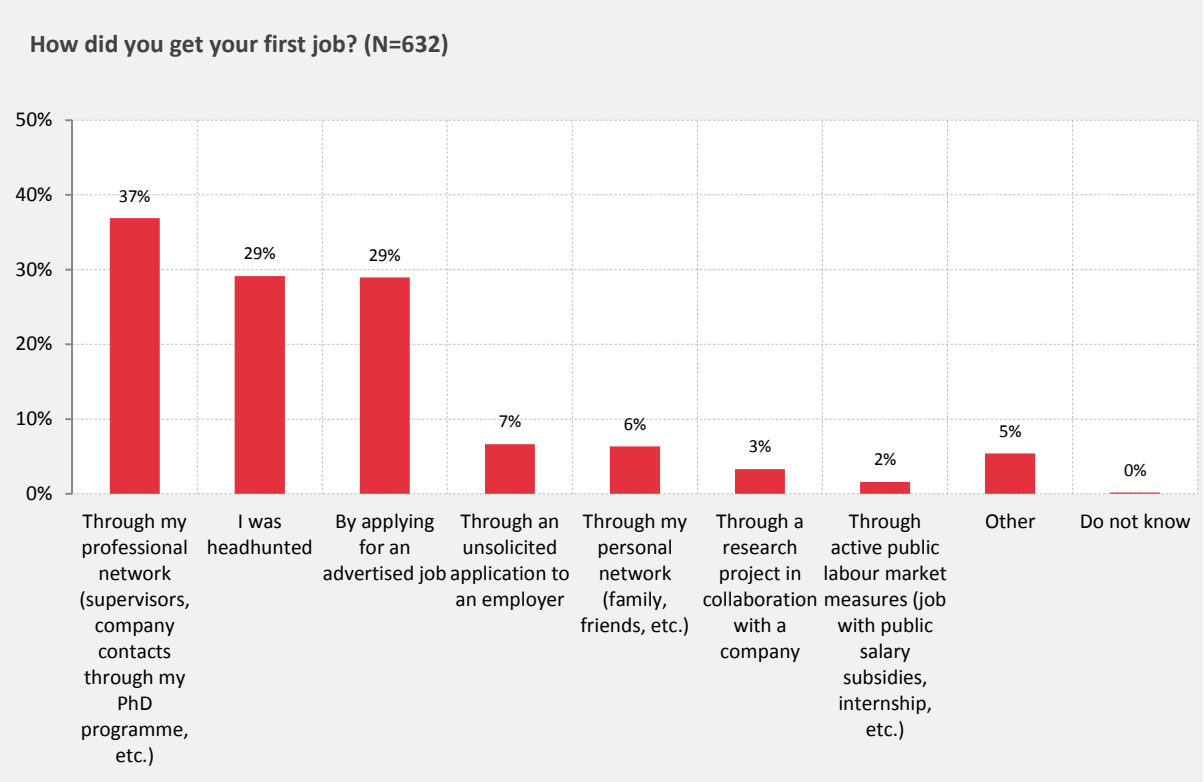
Considerations about the future job do not have a large impact on graduates' choice of courses or how they organize their PhD. 70% answered that considerations about future jobs had no influence or only very little influence on their choice of courses. Only 8% answered that considerations about future jobs had a strong influence. The same tendency applies with regard to whether or not job considerations have influenced how the students organized their PhD.

4.3 THE FIRST JOB AFTER GRADUATION

Professional networks lead to first job

The survey has investigated how the graduates find their first job. The majority of the graduates find their first job through their networks, either professional networks (37%) or personal networks (6%). However, a large number of graduates were headhunted (29%) or employed after an application in answer to a traditional job advertisement (29%).

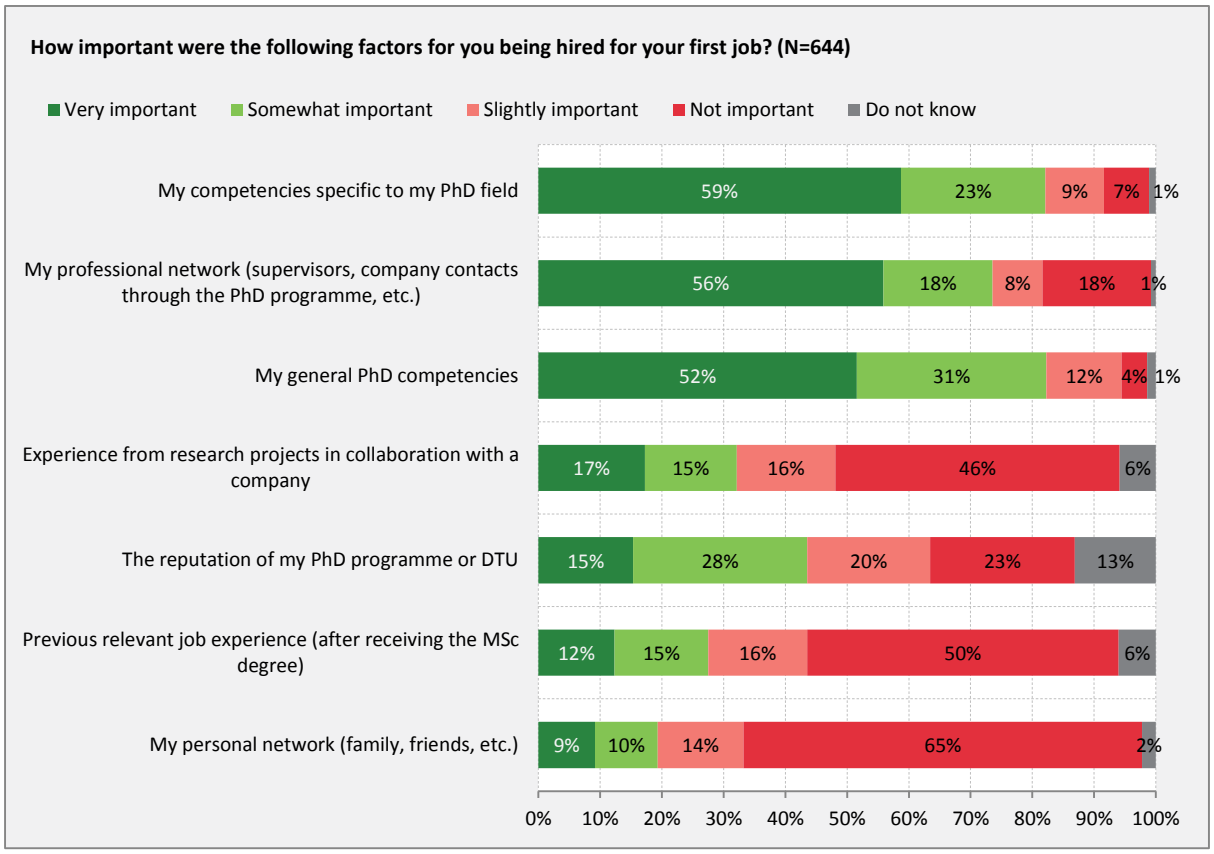
Figure 8: How did you get your first job?



Note: Percentages add up to more than 100%, since respondents were allowed to give more than one answer.

The survey also examined which factors, according to the graduates themselves, were contributory when the graduates were selected for their first job. As can be seen from Figure 9, the majority (82%) answered that competencies specific to the PhD graduate's field of research have been of some importance or great importance when being selected for the first job. The same proportion (82%) answered that general competencies acquired through the PhD programme were of great or some importance. Finally, professional networks were of great or some importance for many (74%). 44% of the graduates answered that the reputation of the PhD programme or DTU was of great or some importance.

Figure 9: How important were the following factors for you being hired for your first job?

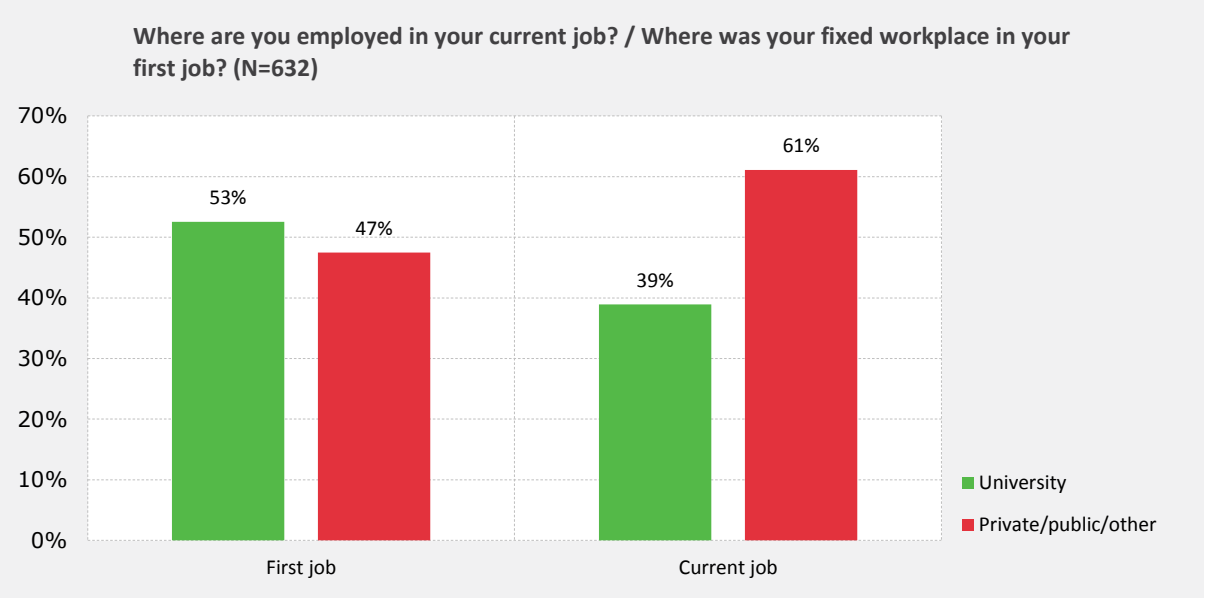


The first job is typically at DTU or another university as a researcher

As shown in Figure 10 slightly more than half of the PhD graduates (53%) began their career as a postdoctoral fellow, researcher, or assistant professor at DTU or another university, while 47% began their career in the private, public or other sector. Currently 39% are employed at DTU or at another university and 61% are employed in the private, public or other sector.

Of the 53% who began their career at DTU or another university, 67% are currently employed at a university whereas 33% are currently employed in the private, public, or other sector. Conversely, nearly all (97%) of 47% who began their career in the private, public, or other sector are still employed in the private, public, or other sector. If one excludes those graduates who have not yet made at least one job change after being employed in their first job, 57% of the graduates who began their career at DTU or another university are currently employed in the private, public, or other sector while 20% of the graduates who began their career in the private, public, or other sector are currently employed at DTU or another university.

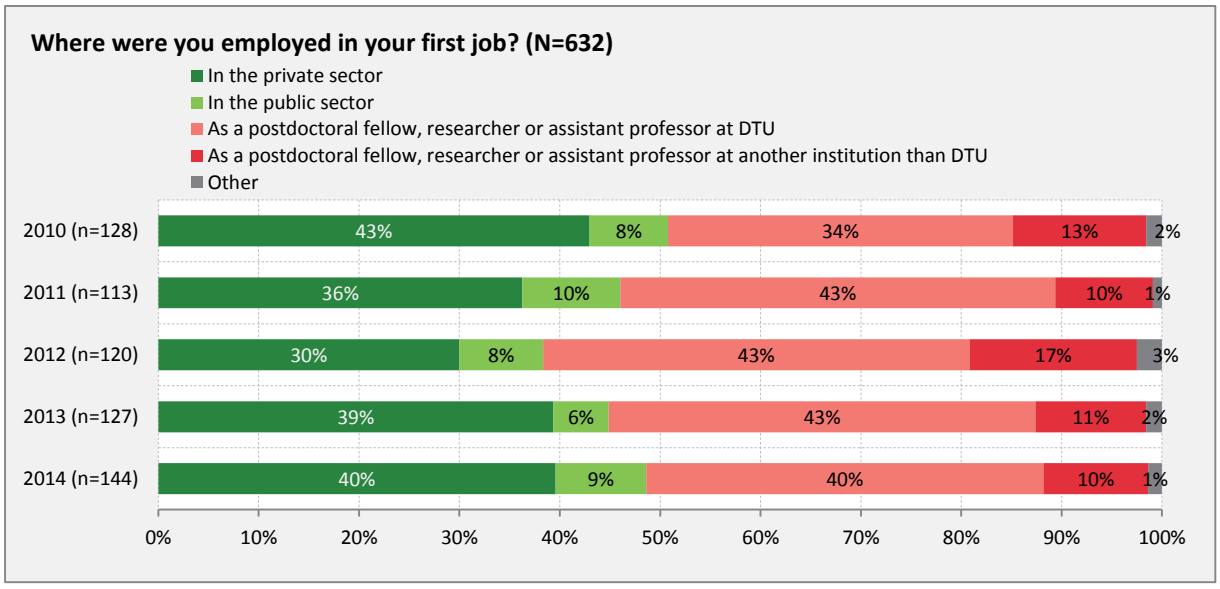
Figure 10: Where were you employed in your first job / Where are you employed in your current job?



Increasing numbers of students are taking a PhD degree and it can be assumed that this means that more graduates must find their first jobs in the private sector. However, the survey shows that the pattern of employment among graduates has been relatively stable since 2011.

As seen in Figure 11, 43% of graduates in 2011, 2012, and 2013 found their first jobs at DTU, dropping slightly to 40% in 2014. Altogether, 48% of graduates in 2010, 53% in 2011, 59% in 2012, 54% in 2013, and finally 50% in 2014 found their first jobs at a university.

Figure 11: Where were you employed in your first job?



Whether or not graduates collaborate with private companies during their PhD programme appears to have a strong influence on their first jobs. For example, the number of graduates who found their first jobs in the private sector is significantly higher among those who have collaborated with industry on their project (61%) than among those who have not (40%).

The first job is also primarily in large companies in the capital region

As mentioned, many graduates have changed from jobs at a university to the private sector. On the other hand, mobility is not so great in purely geographical terms or from small to large companies. Of all graduates, 59% found their first job in the Capital Region of Denmark, and nearly as many (56%) are currently working in the Capital Region. There are 22% of graduates working abroad. In comparison, 32% worked abroad in their first job.

55% of graduates found their first jobs in workplaces with more than 1,000 employees, while 21% were employed for the first time in small or medium-sized companies with fewer than 200 employees. In comparison, 56% are employed in their current jobs in workplaces with more than 1,000 employees, and 19% in workplaces with fewer than 200 employees.

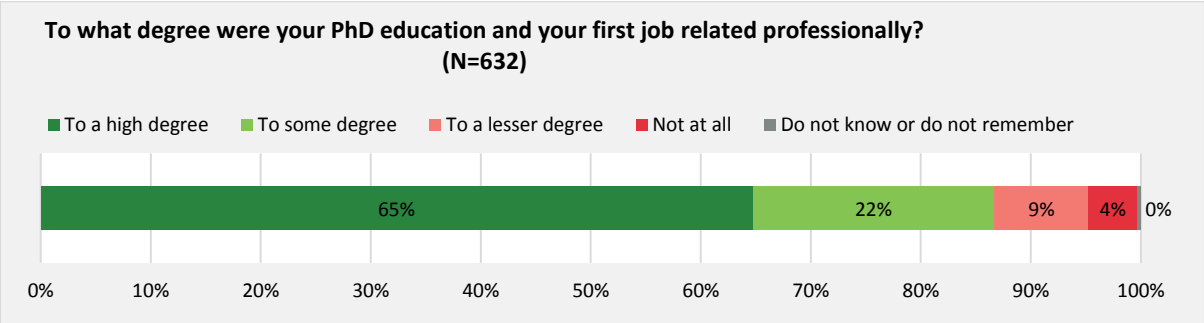
The first job function was primarily research

As was the case for many in their present jobs, many graduates carried out research functions (73%), data analysis (39%), tasks directly associated with the field of research for their PhD (29%), or teaching (28%) in their first jobs. On the other hand, there were relatively few with jobs in administration (4%), production (4%), information (3%), service (2%), management (2%), sales and marketing (2%), and HR (1%).

There is a good connection between the education and the first job

Almost two thirds (65%) of the graduates answered that there was a strong connection between their PhD and their first job. A further 22% answered that there was to some extent a connection. Only 4% answered that there was no professional connection at all, and one in four of these had chosen the job specifically because it had no connection with the PhD.

Figure 12: To what degree were your PhD education and your first job related professionally?



4.4 RECRUITING COMPANIES FIND RELATIVELY FEW CHALLENGES ASSOCIATED WITH THE TRANSITION TO THE LABOUR MARKET

In general, the recruiting companies who were interviewed find the PhD graduates' transition from the study programme to the labour market reasonably smooth, and although most experience minor challenges, they largely overlap with the challenges associated with all newly qualified employees. This also means that the difference in the extent of the challenges is greater when PhD graduates are compared with engineers with an MSc and three years' work experience than PhDs compared with newly qualified MSc's in Engineering.

> *"We experience that PhD graduates have a smooth transition from education to the labour market—just as MSc graduates. The important thing for us is that they must be aware that we are working under different conditions in the private sector compared to the research community. That is the case for the PhD graduates looking for a job with us."*
>
> (Major recruiting company in the electricity, gas, and district heating sector)

However, there are differences: recruiting companies who employ engineering generalists and specialists face greater challenges than recruiting companies who employ research generalists and specialists. The differences in the way recruiting companies experience PhD graduates' transition from study programme to labour market are associated with the different approaches to work in the different job functions. Engineering generalists in particular, followed by engineering specialists, work with a relatively short-term perspective, where for instance customers expect a product after a couple of months, which will give them value immediately. In contrast, research generalists and specialists usually work with a longer horizon, where, for instance, research results do not show their value for several years.

On the PhD programmes at the universities, there is a longer time horizon and plenty of opportunity to go into detail, while the facts of life are different in a public enterprise or a private company that employs engineering generalists and specialists. Here PhD graduates have to learn to meet tight deadlines, where creating value in the short term takes priority over in-depth work that creates value in the longer term. It means that situations can arise when PhD graduates have to acknowledge that the desired professional level is lower than their own, so they have to ease up on their professional pride in order to carry out the assignment as ordered, within the set limits, which some find difficult according to the recruiting companies. As one recruiting company states: *"They have to learn that deadlines are in earnest, and that there is not always time to go into detail. It is important to set up a framework and match expectations."* (Major recruiting company in the building and construction sector.)

Some recruiting companies find that PhDs meet challenges when faced with customer contacts and project management. This is a relationship which most newly qualified PhDs have not experienced before. Many of the recruiting companies interviewed therefore consider a learning phase necessary, for instance in connection with giving differentiated explanations to customers at varying

and frequently lower academic levels. PhD students do not learn these aspects at DTU, and here, according to recruiting companies, industrial PhD graduates have a considerable strong point. At the same time, it is worth noting that the challenges mentioned here are not exclusive to PhD graduates; newly qualified BSc or MSc engineering graduates will face the same challenges. This is precisely where engineers with an MSc and work experience stand out, since in the strength of their work experience they have, for example, already had contact with customers, and can therefore take charge of customer contact earlier. As two major recruiting companies state, independently of each other: *"… If they have three years of work experience, then they are ahead with regard to customer-related criteria..."* (Major recruiter in manufacturing) and *"… If they come direct from university, it may be a shock for them, as the two worlds are very different…"* (Major recruiting company in electricity, gas and district heating supplies).

Several of these recruiting companies also indicate that in the recruitment process they endeavour to align expectations with the PhD graduates, so that they employ the candidates who want to work where there is greater focus on application than on research.

In contrast, the transition is found to be smoother for PhD graduates employed by recruiters where work assignments are primarily in research and development, which means especially the research specialists and generalists. Here the time horizon is longer, and more similar to the situation the graduates already know from their PhD programme. An international recruiting company concerned with development assignments explains: *"It goes easily. The working day is not very different from the university, so they feel they are carrying on where they left off. So for the PhD graduates it is not really a challenge."* (Major recruiting company in another industry).

5. ACQUIRED SKILLS AND COMPETENCIES

This chapter examines the way the graduates see the relevance of the competencies they have acquired in connection with their PhD programme, and not least the match between the competencies they have acquired and the competencies the graduates consider relevant to their future careers. Finally, it describes the demands for competencies among the interviewed recruiting companies and their assessment of how competencies match.

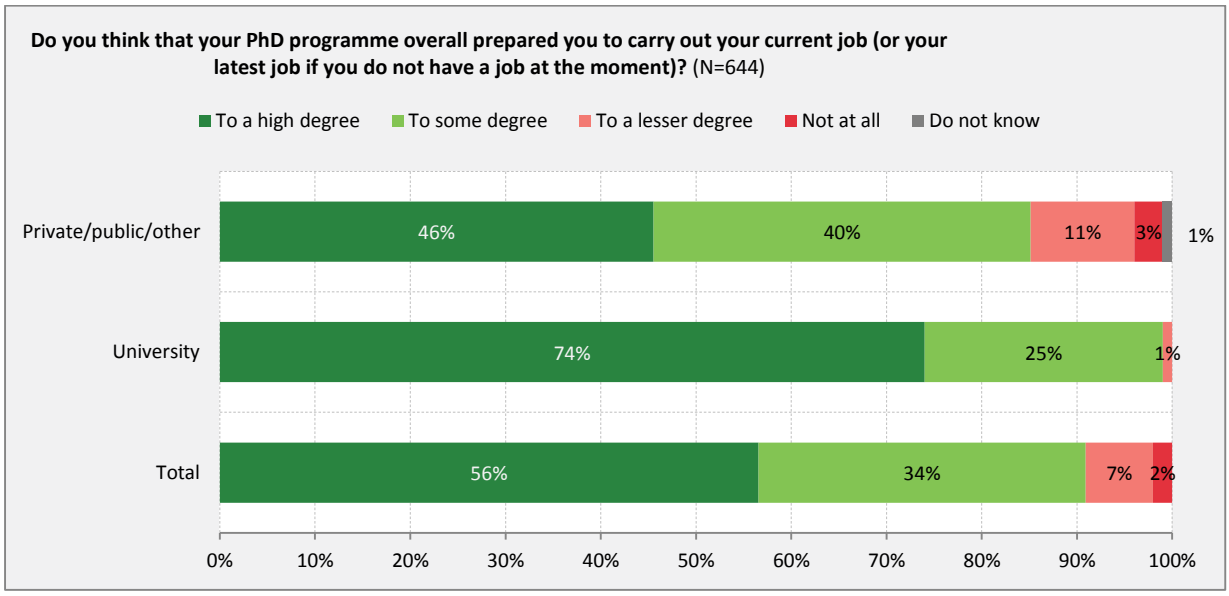
5.1 RELEVANCE OF ACQUIRED SKILLS

Graduates believe that education has prepared them to perform in their current job

56% of the graduates believe that their PhD programme to a great extent has prepared them for their present job, and a further 34% believe this is to some extent the case. Relatively few (2%) feel that their PhD programme has not prepared them at all for their present job, while slightly more (7%) believe that it prepared them to a lesser extent. Thus, the general picture is that the programme prepares the great majority of graduates well for their current work functions.

As can be seen from Figure 13, this applies to a significantly greater extent to graduates working in the university world than to other graduates. The graduates' answers, on the other hand, show no significant connection with their nationality, the year they graduated, or their field of study.

Figure 13: Do you think that your PhD programme overall prepared you to carry out your current job (or your latest job if you do not have a job at the moment)?



Graduates believe that the PhD course gave them competencies that colleagues with a Master's degree followed by 3 years of professional experience have not acquired

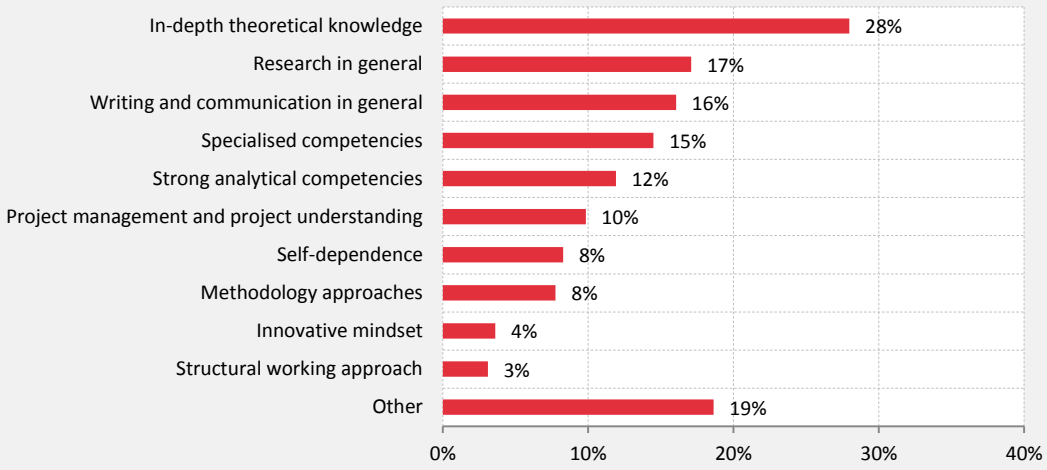
54% of the graduates worked with colleagues who had an MSc followed by three years of work experience in their first jobs after their PhD programme. This refers, therefore, to colleagues with comparable seniority after the Master's degree. We have examined how the PhD graduates experience their own competencies in relation to these colleagues. More than half the graduates (57%) believe that they have better competencies than their colleagues with a Master's degree and three years' work experience, while 23% do not believe so. The remaining 20% do not know. It must be emphasized, naturally, that this refers to the graduates' experience of the levels of competency and that it is not possible to check whether the graduates also believe that they had better competencies than their colleagues before they started the PhD programme.

28% of the graduates emphasize that they have acquired a deep theoretical knowledge which their colleagues do not have. 17% of the graduates mention that they have acquired general competencies in research, 10% mentions particular specialist competencies such as X-ray scattering, inorganic chemistry and CFD analysis or the like, and 8% mention that they have a better understanding of methodical procedures than their colleagues.

Apart from these relatively specific and specialized competencies, the graduates emphasize that they have better general competencies, such as disseminating knowledge and writing (15%), analytical competencies (12%), project management and understanding of projects (10%) and an ability to think innovatively (4%), which their colleagues with three years' work experience after their Master's degree do not have.

Figure 14: Acquired competencies that your colleagues with 3 years of relevant job experience do not have?

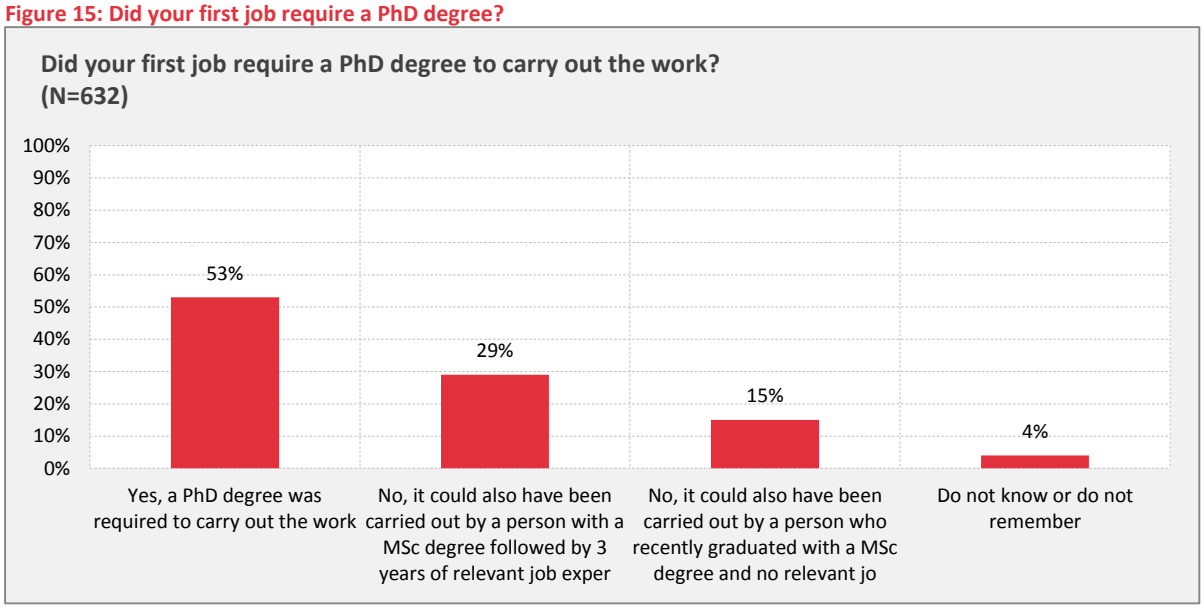
Did you think that you had acquired relevant competencies through your PhD programme that your colleagues who had a master-level degree followed by 3 years of relevant job experience do not have? (N=193)



Note: Percentages add to more than 100%, since respondents could state that they have acquired several competencies that their colleagues do not have.

To form a picture of whether there is a demand for the competencies that are acquired, the graduates were asked whether they had found jobs that required a PhD. As can be seen from Figure 15 below, 53% of the graduates answer that the PhD was necessary to fulfil their first job. An additional 29% answer that the job could be done by a person with a Master's degree followed by three years' relevant work experience. Finally, 15% answer that a newly qualified MSc graduate could do their job.

Figure 15: Did your first job require a PhD degree?

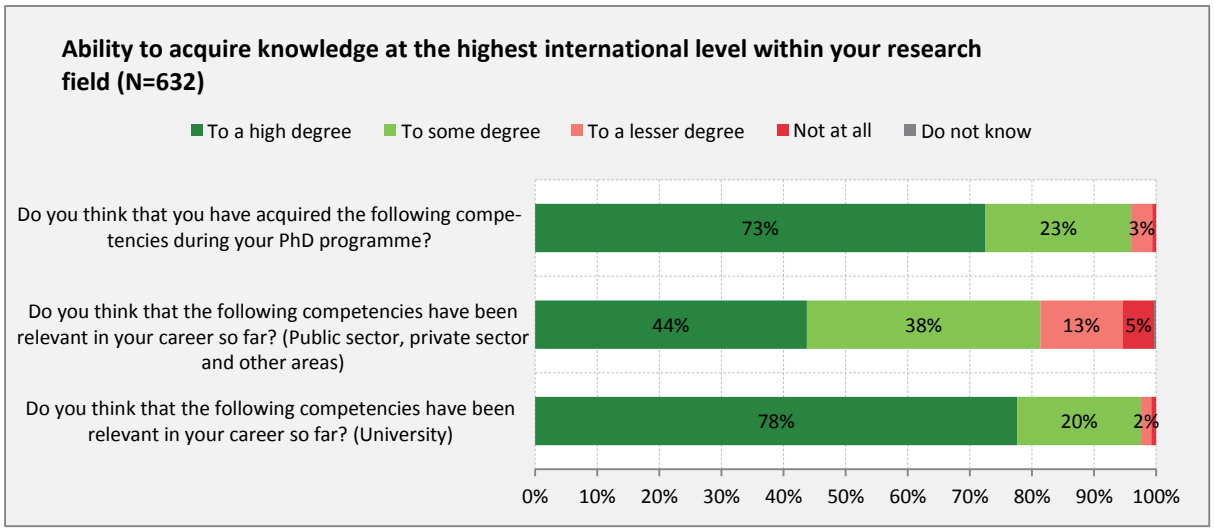


5.2 RESEARCH COMPETENCIES

Ability to acquire knowledge at the highest international level

Almost all graduates (96%) believe either to a high degree or to some degree that they have gained competencies in acquiring knowledge at the highest international level within their research field. Among the graduates working at a university, this is the most relevant competencies in their day-to-day work. Thus, 78% state that it is relevant to a high degree. On the labour market outside the universities—in the private sector, public sector and other areas—this is also one of the competencies with greatest relevance though not to quite the same extent, since 44% of these graduates state that it has to a high degree been relevant in their careers so far.

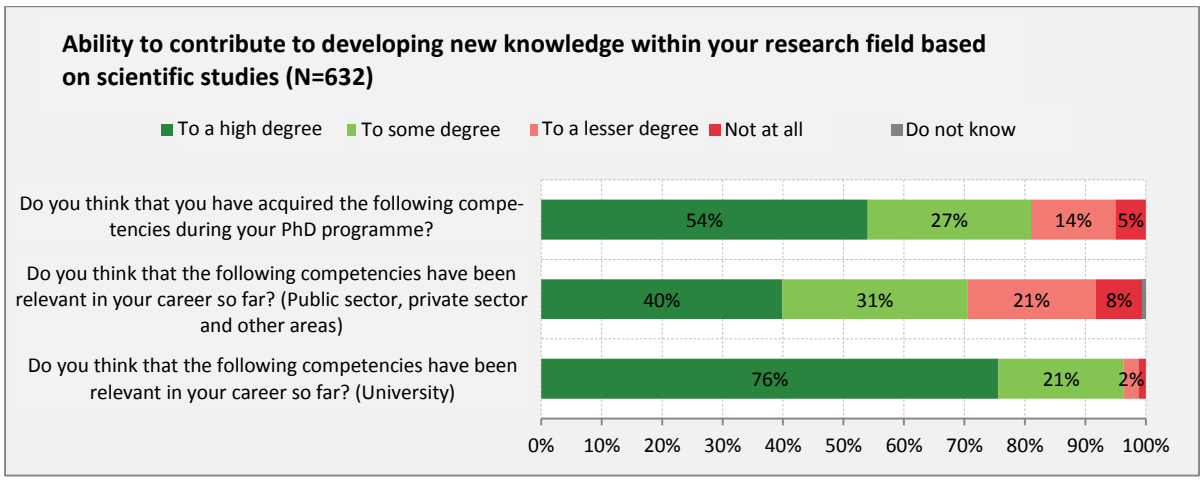
Figure 16: Ability to acquire knowledge at the highest international level within your research field



Ability to contribute to developing new knowledge based on scientific studies

93% state that they to a high degree or to some degree have acquired the competency to contribute to developing new knowledge within their research field based on scientific studies through their PhD programme. The ability to contribute to developing new knowledge on the basis of scientific studies is relevant to a high degree for 76% of the graduates working at a university. This applies to 40% of those who have found a job in the public or private sector.

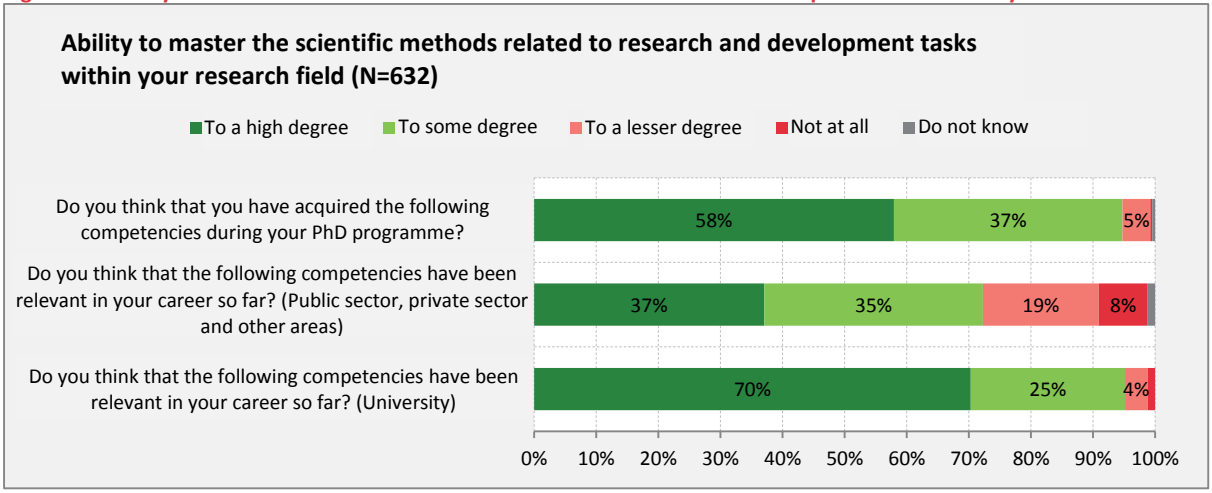
Figure 17: Ability to contribute to developing new knowledge within your research field based on scientific studies



Ability to master the scientific methods

58% of the graduates believe that they to a high degree have acquired the ability to master the scientific methods related to research and development tasks within their research field through their PhD programme, while it is the case to some degree for 37%. The ability to master scientific methods is a highly relevant competency for graduates working at a university (70%). This competency is also relevant to the careers of graduates who have found work in the private or public sector and other areas outside the universities, though not to the same extent (37%).

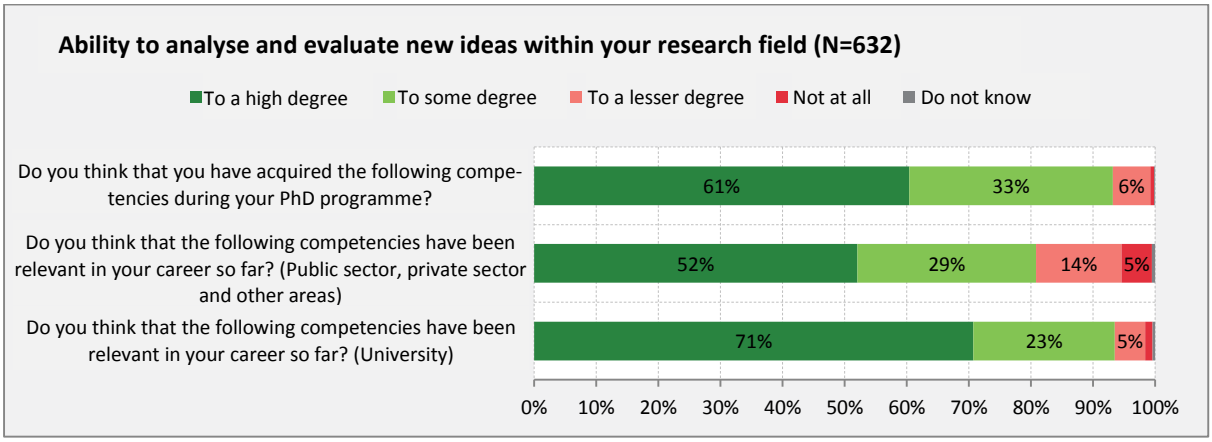
Figure 18: Ability to master the scientific methods related to research and development tasks within your research field



Ability to analyse and evaluate new ideas

94% of the graduates answer that they have acquired the competency to analyse and evaluate new ideas to a high degree or to some degree through their PhD programme. The ability to analyse and evaluate new ideas is the competency considered by the largest proportion of graduates employed at universities to have been to a high degree relevant in their careers so far (71%). 52% state that it is relevant to a high degree when working in the public, private sectors, or other areas (outside universities).

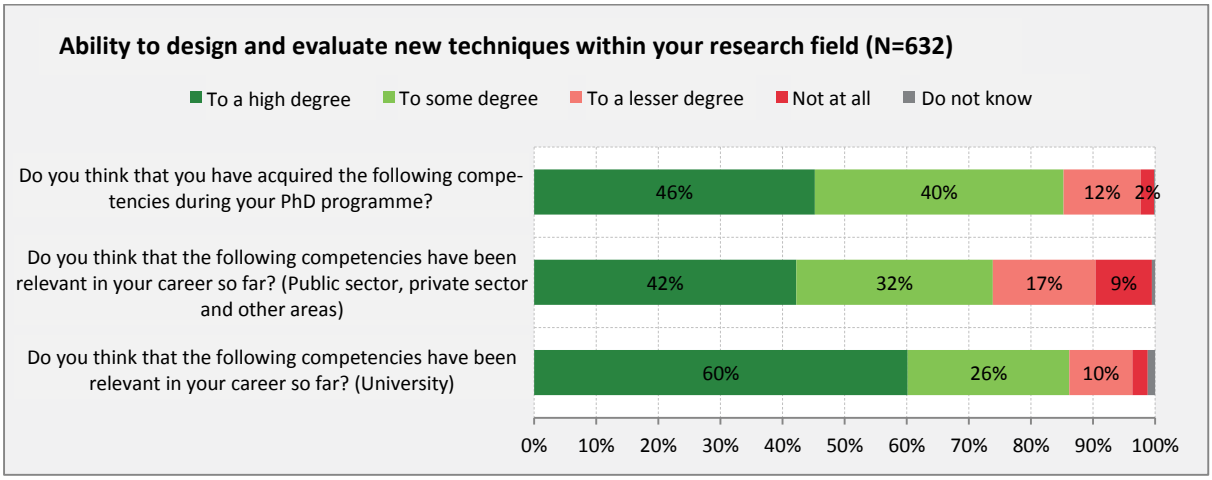
Figure 19: Ability to analyse and evaluate new ideas within your research field



Ability to design and develop new techniques

86% believe that they have acquired the ability to design and develop new techniques within their research field to a high or to some degree through their PhD programme. 42% of the graduates employed in the private, public sectors, or other areas outside the universities answer that the ability to design and develop new techniques has been relevant in their careers so far. This applies to slightly more of the graduates working at universities (60%).

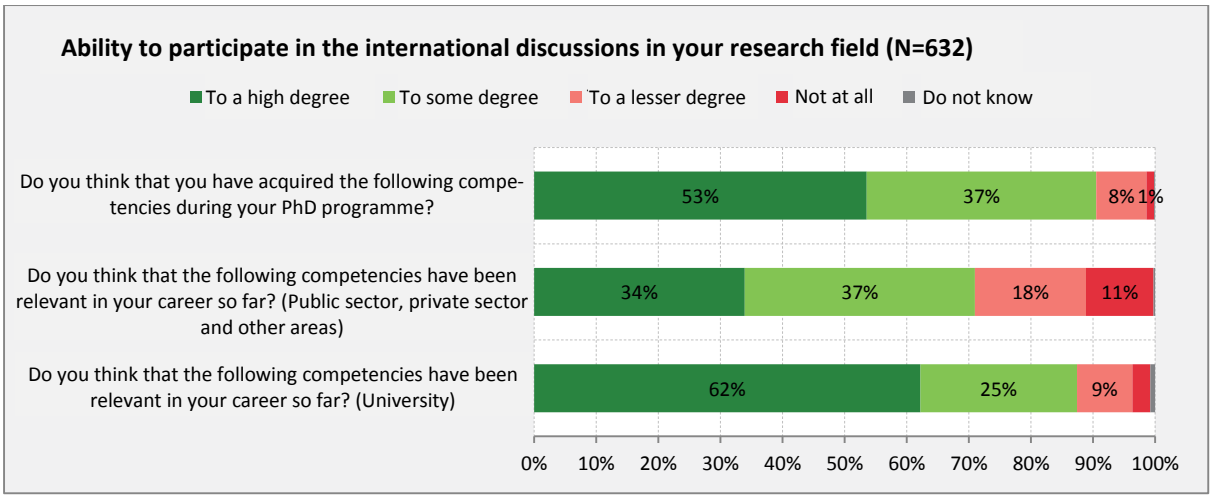
Figure 20: Ability to design and develop new techniques within your research field



Ability to participate in international discussions

90% believe that they have acquired the ability to participate in the international discussions in their research to a high degree or to some degree through their PhD programme. The competency is considered more relevant among graduates employed at a university (62% answer to a high degree) than for those who work outside the universities (34% answer to a high degree).

Figure 21: Ability to participate in the international discussions in your field

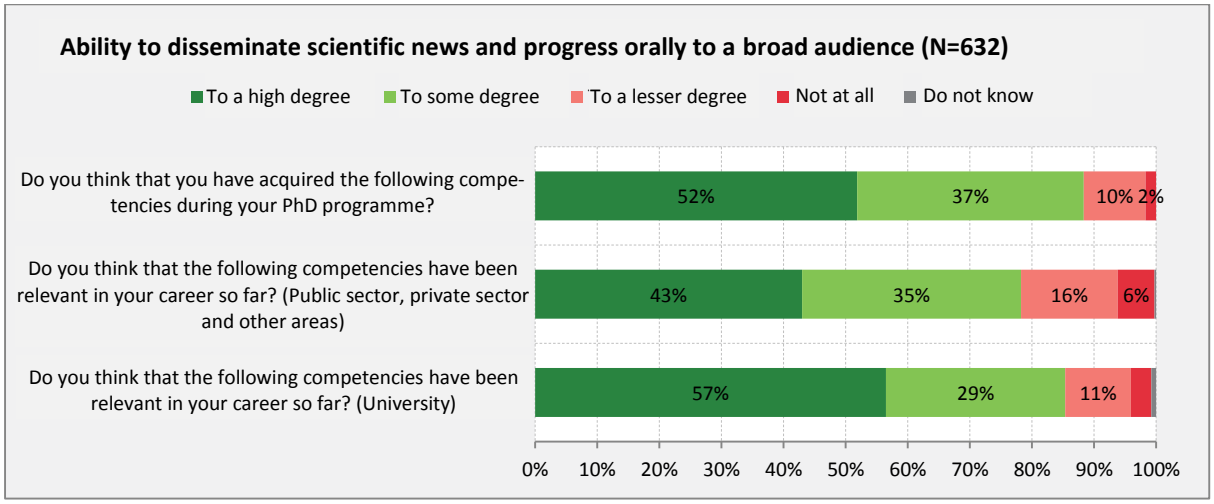


5.3 PERSONAL COMPETENCIES ASSOCIATED WITH DISSEMINATING KNOWLEDGE & PROJECT MANAGEMENT

Ability to disseminate scientific news and progress orally

Oral presentation is a relevant competency for graduates regardless of where they find work. 89% state that they to a high degree or to some degree have acquired competencies in oral presentation during their PhD programme. 43% of those employed in the private sector, the public sector, or other areas (outside universities) and 57% of university-employed graduates have found this competency relevant (to a high degree) for their careers so far.

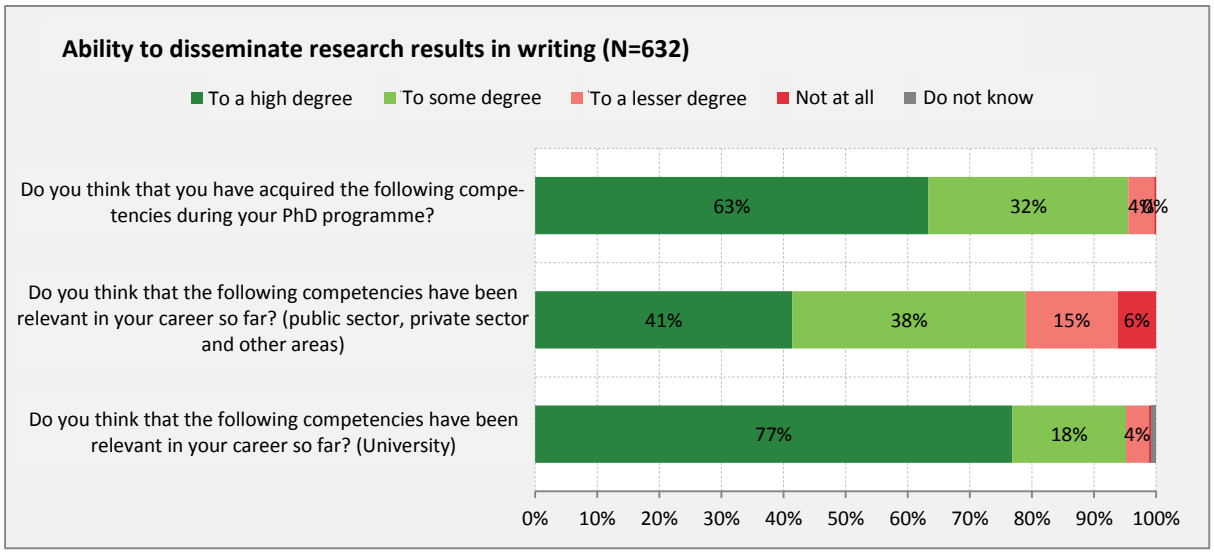
Figure 22: Ability to disseminate scientific news and progress orally to a broad audience



Ability to disseminate research results in writing

The ability to disseminate research results in writing is a competency that 95% of graduates believe they have acquired through their PhD programme (to a high or to some degree). This competency is valued second-most relevant among those employed at universities, and is also one of the highest valued competencies among those employed outside universities. The ability to disseminate knowledge in writing is more relevant for graduates who have found employment at a university. 77% state that they to a high degree find the ability relevant in their careers so far compared to 41% of the graduates working outside universities.

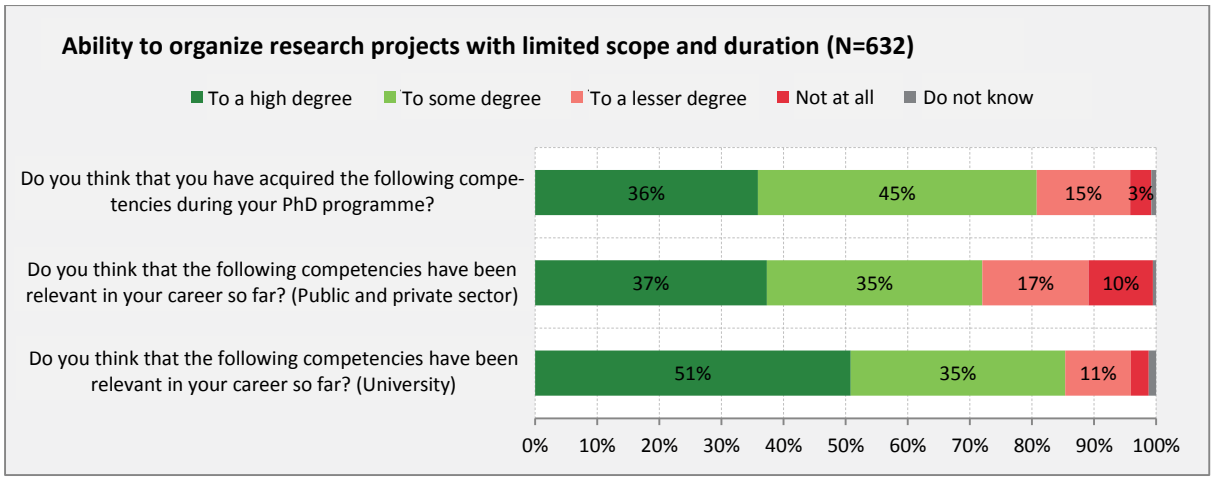
Figure 23: Ability to disseminate research results in writing



Ability to organize research projects

Compared with the competencies mentioned earlier, there are fewer who believe that they have acquired the ability to organize research projects of limited scope. 36% agree to a high degree that they have acquired the ability, and a further 45% believe that it applies to some degree (81% in total). The ability to organize research projects of limited scope is especially considered relevant for many of the graduates employed at a university (51%), while it is less relevant for employees outside the universities (37%).

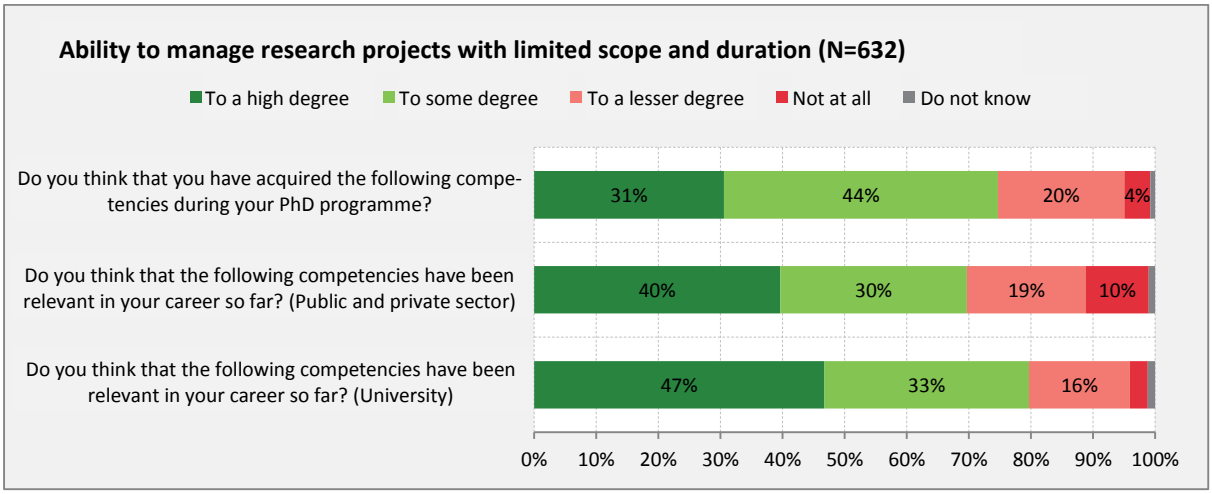
Figure 24: Ability to organize research projects with limited scope and duration



Ability to manage research projects

Compared with the competencies mentioned earlier, there are also slightly fewer who believe that they have to a great extent acquired competencies in managing research projects. 31% believe that this is the case to a high degree, and a further 44% believe that it applies to some degree (75% in total). There is no great difference between the assessment of the relevance of this competency among employees at universities and employees outside universities. Among university employees, 47% believe that the ability to manage research projects has been relevant to a high degree for their careers so far while the same applies to 40% of those employed outside universities.

Figure 25: Ability to manage research projects with limited scope and duration

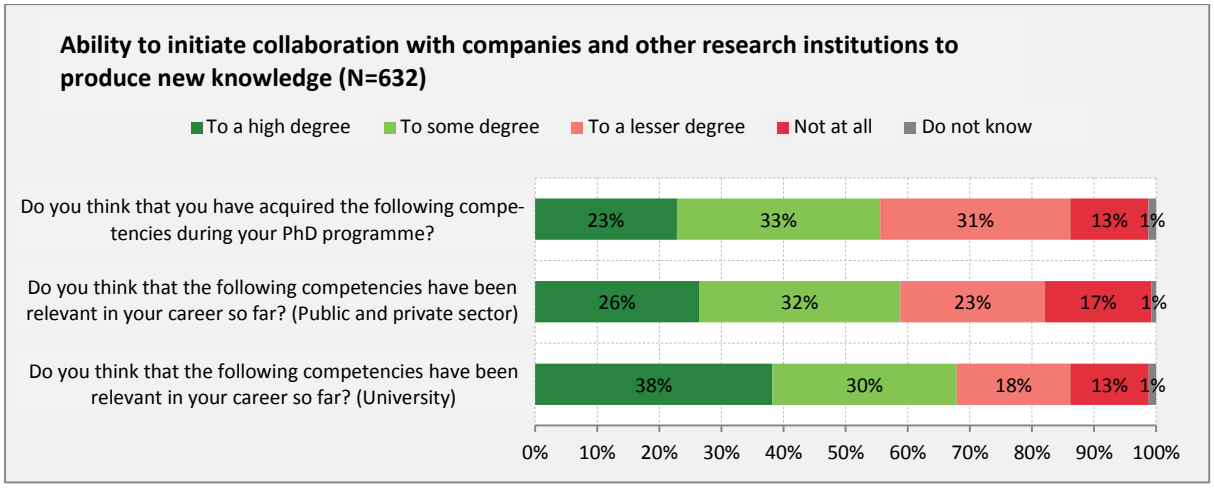


5.4 COMPETENCIES IN INNOVATION

Ability to initiate collaboration with companies and other research institutions

Slightly more than half the graduates (56%) feel that they either to a high degree or to some degree have acquired the ability to initiate collaboration with other companies or research institutions to produce new knowledge. The competency is considered slightly more relevant for employees in the university sector (68%) than outside the universities (58%).

Figure 26: Ability to initiate collaboration with companies and other research institutions to produce new knowledge

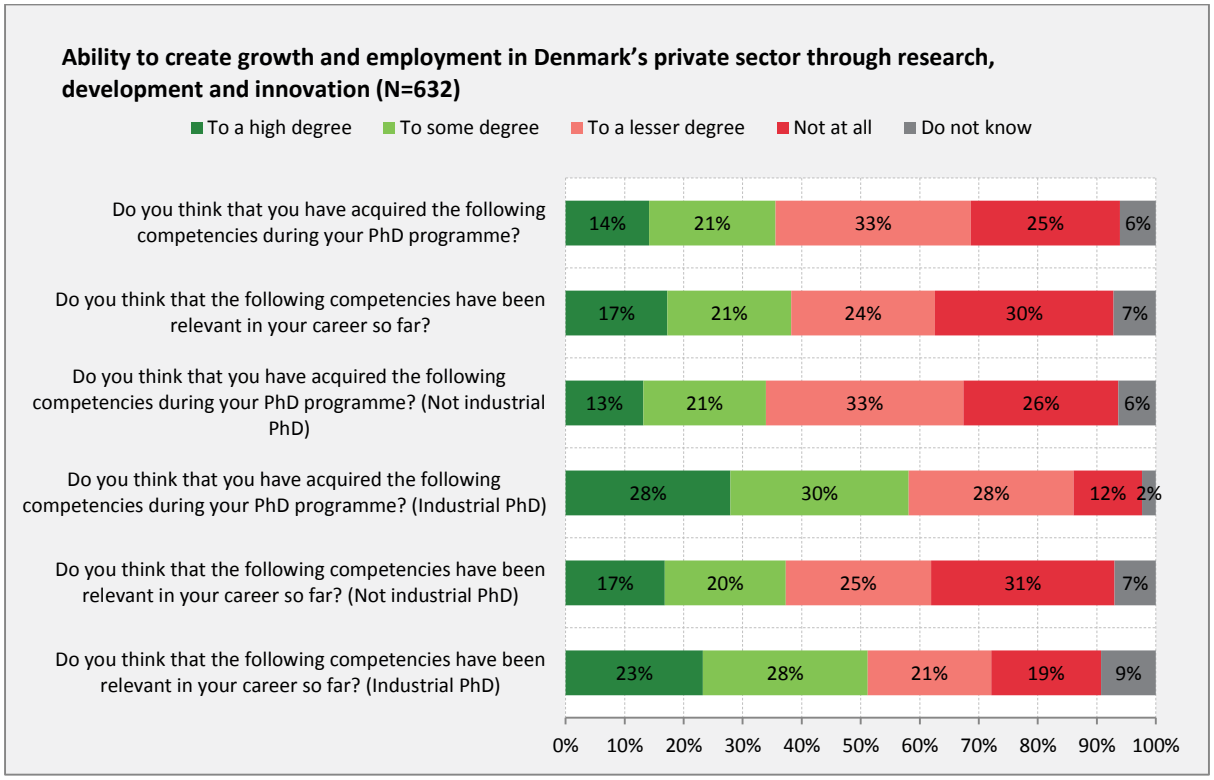


Ability to create growth and employment in Denmark's private sector through research, development, and innovation

Of all the competencies whose relevance the graduates have been asked to evaluate, the ability to create growth and employment through research, development, and innovation is the one which fewest consider they have acquired, and similarly, fewest believe that it has been relevant for them in their careers so far.

35% of the graduates believe that they to a high degree or to some degree have acquired the ability to create growth and employment. A largely corresponding number of graduates (38%) believe that this ability is relevant in their careers. Slightly more of the employees outside the universities consider this relevant to their careers (42%) than employees at universities (32%). More industrial PhD graduates (58%) than traditional PhD graduates (34%) think they have acquired the ability to create growth and employment in Denmark's private sector through research, development and innovation.

Figure 27: Ability to create growth and employment in Denmark's private sector through research, development, and innovation



5.5 THE DIFFERENCE BETWEEN THE ACQUIRED SKILLS AND THE SKILLS GRADUATES PERCEIVE AS RELEVANT TO THEIR CAREER

As can be seen from the previous section, the survey indicates that the great majority of graduates assess the programme positively with regard to acquisition and relevance of professional engineering competencies. Thus, for most target competencies there is a correlation between the number who believe that to a high degree or to some degree they acquired a competency, and the number who believe that the competency is relevant to the labour market. At the same time, there is often a correspondence at individual level, so that the graduates who have replied that a competency is relevant also answer that they have acquired that competency.

When focus is centred on the match between the competencies which the graduates have found to be relevant for their careers and the competencies they have in fact acquired, there are some differences between graduates employed at a university, those employed outside universities and the industrial PhDs.

Figure 28, 29 and 30 illustrate the match of competencies, showing on the y-axis (vertical) how highly relevant the graduates consider the competency to have been for their career so far

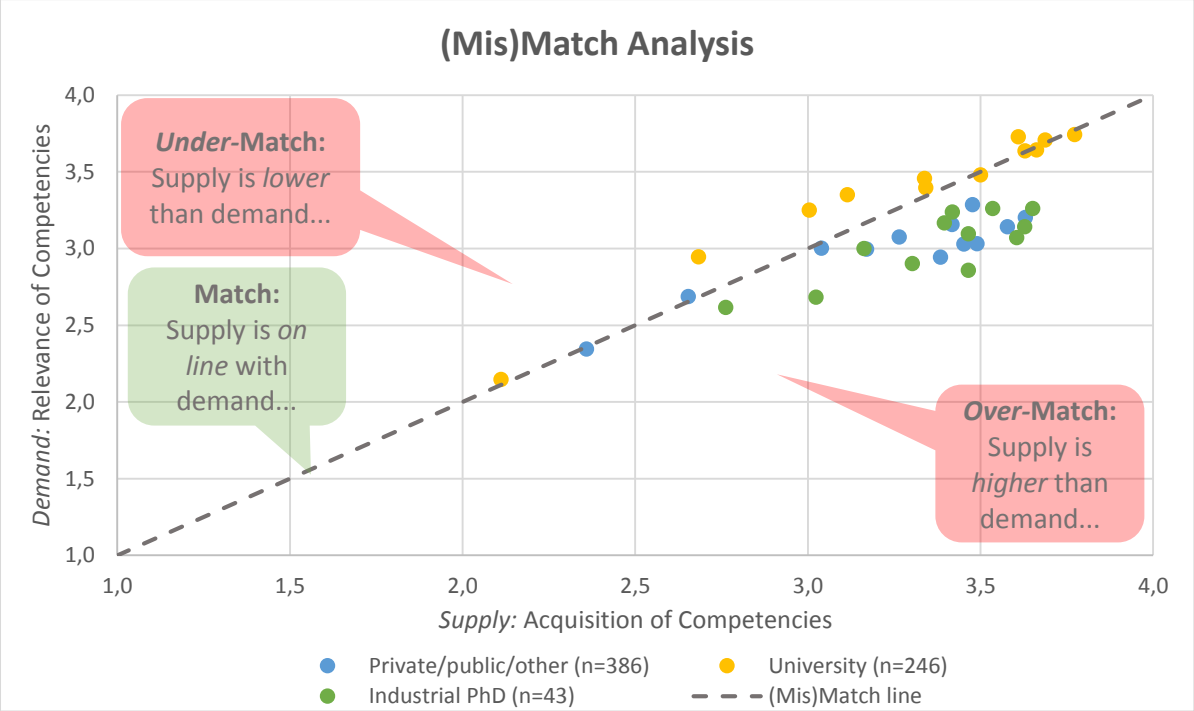
(demand), and on the x-axis (horisontal) to what extent they have acquired the competency (supply).

The yellow dots indicate the answers from employees at universities, the blue dots show answers from employees in private, public or other businesses outside universities while the green dots are industrial PhDs.

A dot above the broken line indicates that the graduates consider a competency more relevant or more in demand than they have actually acquired it (a so-called under-match). A dot below the broken line indicates that the graduates consider a competency less relevant or less in demand than they have actually acquired it (a so-called over-match). Dot on the broken line or close to the broken line indicates a match between the demand and supply of a given competency.

The figure below shows an overview of the match between demand and supply of competencies. The two following figures focus on scientific and supporting competencies, respectively.

Figure 28: (Mis)Match Analysis – an overview



Note: The graph shows along the y-axis to what extent graduates believe that the competency has been relevant to their careers so far, and on the x-axis whether they acquired the competency during their PhD studies. If the value on the y-axis is 4, it corresponds to all graduates answering 'to a high degree', while the value 1 corresponds to all graduates answering 'not at all'.

Figure 29: (Mis)Match Analysis – Scientific Competencies

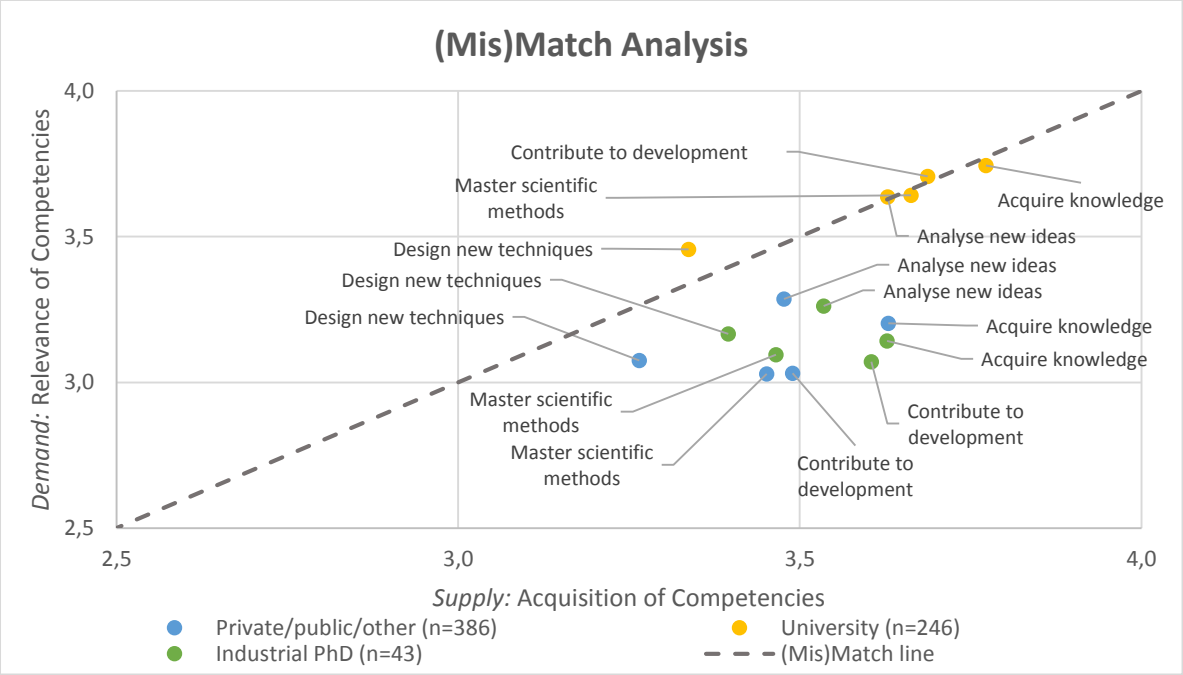
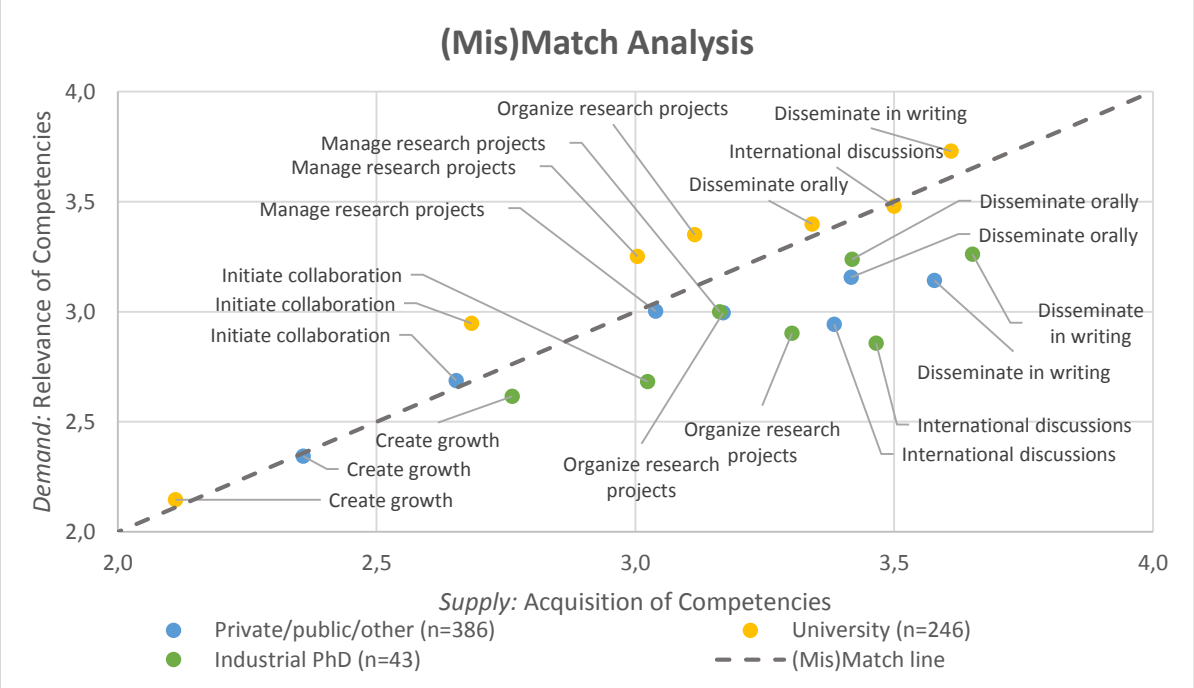


Figure 30: (Mis)Match Analysis – Supporting Competencies



5.6 RECRUITERS' COMPETENCY REQUIREMENTS DEPEND ON JOB FUNCTIONS

Regardless of which competency profile the recruiting companies in the qualitative interviews are seeking, they all believe high general professional expertise to be important. It varies, however, which type of professional expertise they are referring to. As indicated by the typologies in section 3.3, some prioritize a high level of engineering expertise, while others prioritize a high level of research expertise. Similarly, some of the interviewed recruiting companies attach importance to in-depth, field-specific knowledge (for example knowledge of a specific chemical process), or broader knowledge in a number of engineering fields (such as general knowledge of chemistry). Since the competencies sought by recruiting companies vary a great deal, depending on job functions, the competency requirements below will be described in the framework of the four job typologies. (For an explanation of the job typologies, please see section 3.3.)

Recruiting companies who employ engineering generalists seek employees who…

- Possess a broad knowledge of a wide field of engineering (e.g. biochemistry)
- Can quickly familiarize themselves with a set of problems or a field of knowledge
- Are reliable when it comes to repeating work assignments in the same way and in the same high quality
- Can support operations and processes that are already running through their reliability and by applying their broad knowledge.

Recruiting companies who employ engineering specialists generally seek employees who…

- Can work in depth on highly complex assignments in a specific field of engineering (e.g. a biochemical process)
- Have profound knowledge of engineering in connection with the specific assignment
- Can keep themselves up to date, so that they possess the latest knowledge in their limited field in the strength of their creativity and the capacity for innovative thinking
- Can support and develop operations and processes that are already running.

Recruiting companies who employ research generalists seek employees who…

- Possess a broad knowledge of a wide field of engineering (e.g. biochemistry)
- Can quickly familiarize themselves with a set of problems or a field of knowledge
- Have knowledge of scientific methods and are able to apply and reflect on different scientific methods
- Keep themselves updated, so that they possess the latest knowledge of research methods
- Can develop new knowledge and new methods in the strength of their creativity and the capacity for innovative thinking
- Have a wide professional network and the ability to bring it into play in connection with specific assignments.

Recruiting companies who employ research specialists seek employees who

- Can work in depth on assignments in a specific field of engineering (e.g. a biochemical process) with a high level of complexity on the strength of their level of analytical abstraction, research method, and ability to reflect on and evaluate different research methods compared with each other
- Have profound knowledge in connection with the specific assignments
- Have knowledge of scientific methods and are able to apply and reflect on different scientific methods
- Keep themselves updated, so that they possess the latest research expertise (e.g. research methods etc.)
- Keep themselves updated, so that they possess the latest knowledge of their specified field
- Can develop new knowledge and new products in their specified field in the strength of their creativity and capacity for innovative thinking
- Have a wide professional network and are able to bring it into play in connection with specific assignments.

Supporting competencies are most important for recruiting companies seeking engineering expertise

The supporting competencies most often sought by recruiting companies in the qualitative interviews:

- Capacity for interdisciplinary collaboration is the most widely sought competency across all types of recruiting companies because the primary working method is team organization. All employees, and PhDs too, must therefore be able to take part and collaborate constructively with their own and other forms of expertise
- The ability to enter into multicultural working environments is mentioned in several ways as a vital supporting competency for the majority of recruiting companies. It includes, for instance, cultural understanding, since many recruiting companies either have employees from abroad or partners or clients abroad, and the PhD graduates must therefore be able to get along and collaborate
- Fluency in English is emphasized among the major recruiting companies, since English is the corporate language of several recruiting companies
- The ability to disseminate professional knowledge adapted to the professional levels of colleagues, business partners and customers is an important supporting competency, primarily among recruiting companies who employ engineering generalists and engineering specialists. These profiles — in addition to interdisciplinary collaboration — often include an expert or advisory role, which makes considerable demands on the ability to put information across and the ability to help other employees to bring the PhD graduate's knowledge into play. An expert or advisory role also involves interdisciplinary understanding and the ability to bring one's own knowledge into play in other people's work routines

- Being adaptable is emphasized as an important supporting competency among recruiting companies who employ generalists, since they must be able to shift focus in their engineering field according to varying and specific assignments
- Similarly, project management is sought by recruiting companies who employ PhD graduates as project managers, but some recruiting companies give less priority to this competency, since it is considered to be one they can learn in the company.

Most recruiting companies consider the subject-related competencies as the core competencies, which must be in place, but the supporting competencies may tip the balance when there are two equally qualified applicants for one job.

In general, recruiting companies find that the PhD graduates' competency profiles matched the company's competency requirements

The recruiting companies emphasize that the PhD graduates possess in-depth knowledge gained during their three-year research training. The overall impression across all interviews with recruiting companies is that the PhD graduates contribute professionally with:

- A high level of analytical abstraction
- A broad foundation of engineering knowledge from their MSc education
- In-depth knowledge of engineering in a specified field gained during their PhD programme
- The ability to acquire knowledge at the highest international level
- The ability to design and develop new techniques, methods, knowledge and products, etc. in a specified area
- Mastery of scientific methods.

Altogether, recruiting companies find that PhD graduates to a great extent live up to the companies' requirements for competencies. The match is described below in relation to each of the four job typologies.

Engineering generalists

Recruiting companies who employ engineering generalists find that the PhD graduates possess the engineering expertise they are seeking. **The recruiting companies emphasize that in many cases the PhD graduates are competing directly with MSc graduates for the positions advertised, since the various tasks in their daily work require the fundamental engineering expertise which both profiles possess.** The MSc graduates with relevant work experience often distinguish themselves through their generalist competencies, while PhD graduates possess specialist knowledge to a greater extent. Although PhD graduates may not possess the broad knowledge from the outset, it does not necessarily make them less attractive, since they are also seen as quick to assimilate new material.

MSc graduates with three years' work experience are employed more often in this function, because of their broad knowledge of engineering, but also as a matter of supply and demand, as there are more MSc graduates than PhD graduates. At the same time, one or two recruiting companies emphasize that if they employ PhD graduates in positions of this type, they take great care to match

expectations with regard to job functions, since the generalist role may seem distanced from the PhD graduates' specialization, which in individual cases may be challenging for the PhD graduate's motivation.

Engineering specialists

Recruiting companies who employ engineering specialists believe that the PhD graduates possess the engineering expertise they are seeking. PhD graduates are an outstanding match in the specialist role, contributing with highly specific knowledge and capable of taking on assignments in defined problem areas. **The employers find that, with a few exceptions, MSc graduates with three years' work experience do not possess the same in-depth knowledge as PhD graduates**. Those MSc graduates who do possess this knowledge will typically have worked in highly specialized positions, and have become specialists in that way. The recruiting companies interviewed believe that PhD graduates contribute with a higher level of analytical abstraction, greater theoretical understanding, and a more development-oriented view of how, for example, work processes can be rethought. However, the PhD graduates must be motivated, since the job functions for engineering specialists often entail disseminating knowledge to people with many different types of expertise at varying levels, internally in the recruiting company and/or externally, and the role often involves expectations of supporting competencies such as ability to collaborate and communicate.

> *They come with top-level engineering competencies—they often bring new methods and new knowledge to the company, which is an advantage. We have to train them with regard to focusing on a goal. We need a solution while PhD graduates are used to the idea that all conclusions are fine. We have to teach them that they must finish their tasks on time. They often need better communication skills—to communicate things more simply, clearly and briefly.*
>
> (Major recruiting company in the production sector)

Research generalists

Recruiting companies find an excellent match between PhD graduates and their requirements for research generalists. **The recruiting companies primarily emphasize the PhD graduates' capacity for analysis at a high level of abstraction, and their competencies in scientific method, where they can evaluate and reflect on different methodical approaches and their significance for the solution of the assignment**. Additionally, recruiting companies point out the PhD graduates' ability to assimilate new knowledge in an engineering field, in the process of carrying out assignments as research generalists, and therefore working in a wider field than the specialists. At the same time, one recruiting company pointed out the benefits from their PhD graduates' networks when the PhD graduate concerned prepared to tackle a specific set of problems which could be solved through knowledge of scientific method, but of which the individual did not have in-depth professional knowledge.

Research specialists

Recruiting companies who employ research specialists find that the PhD graduates possess the research expertise they are seeking. According to the recruiting companies, the PhD graduates distinguish themselves especially through their research expertise with a high level of analytical abstraction and mastery of scientific methods. **Recruiting companies consider the PhD graduates to be an obvious fit for the specialized and creative role they take up in these recruiting companies, because they possess the necessary combination of high-level research expertise and specialized engineering knowledge in a defined field.** The recruiting companies find that the PhD graduates match the development and research-oriented aims involved in the research specialist function. Several recruiting companies have good experiences of graduates' ability to design and develop new techniques in a defined area, and they employ exclusively PhD graduates in positions of this type, since these PhD graduates have unique research competencies that in principle cannot be replaced by MSc graduates.

Requirements for a high level of specialization are not always matched

Several recruiting companies provide services in areas that are so specialized that they are not able to find sufficiently specialized employees. According to these recruiting companies, study programmes that provide specific training for these recruiting companies' fields do not exist. They find therefore that it may be necessary to build further on the existing qualifications of their new employees. They point to PhD graduates as easier to 'educate', since on the strength of their research programmes they are already trained to assimilate complex knowledge. At the same time, it means that the companies are oriented towards PhD graduates who have worked with a project in a field that supports the company's product. One major recruiting company mentions for example, that "*It would be fantastic if we found those who know a lot about x, x and x as well as knowing about processes. But we don't, because there are no study programmes in Denmark that focus on our specific field, so we provide them with the required knowledge. We can get it from abroad. We look primarily for the right person among the candidates, and at whether they can assimilate knowledge—they must be clever. And of course, whether they are interested in the field, so they are motivated.*" (Major recruiting company in the field of liberal, scientific and technical services). This recruiting company describes PhD graduates as a 'safe bet', because they have learnt through their research training to assimilate professional knowledge at a high level. Thus, the match is not perfect, but it is the best possible, since these recruiting companies acknowledge that they cannot expect PhD students to be educated in their specific field.

The importance of the supporting competencies varies, and they are matched to varying degrees

While recruiting companies expect PhD graduates to have professional competencies acquired through the PhD programme, the supporting competencies are more often competencies the graduates have in the strength of their personalities and individual experience. As mentioned earlier, recruiting companies who seek engineering generalists and specialists are looking more for the supporting competencies, while recruiting companies who employ research specialists seek the supporting competencies to a far lesser extent. Thus, a match or mismatch between the demand for supporting competencies is far more important to the recruiters who strongly prioritize the supporting competencies.

> *We employ the approach and train the competencies. That means competencies related to being a consultant, not core professionalism. The approach is about being outgoing, with an enquiring mind—because we have to seek out clients and be proactive. Then you have to be an attentive listener who can ask relevant questions.*
>
> (Major recruiting company in the liberal, scientific, and technical service sector)

Among recruiting companies who attach the greatest importance to supporting competencies, there is a slight variation in how they evaluate the match. Some find it necessary to train PhD graduates as project managers in the company, for example, while others believe that PhD graduates stand out slightly from other newly qualified employees, through their experience of organizing and managing research projects. In contrast, recruiting companies who focus on generalists and specialists in research find that the PhD graduates' competencies in project management match the requirements, since job functions in these companies do not necessarily involve project management.

The same picture appears with regard to evaluation of the PhD graduates' ability to disseminate expertise to colleagues, business partners, and clients at varying professional levels. Competencies of this type are in far greater demand among recruiting companies of generalists and specialists in engineering. Overall, the PhD graduates' competencies match the recruiting companies' requirements, but several recruiters of this type find it necessary nevertheless to upgrade the PhD graduates' skills after they are employed.

Recruiters highlight the PhD graduates' ability to enter a multicultural work environment and take part in interdisciplinary collaboration as satisfactory.

PhD graduates and MSc graduates with three years' relevant work experience each have their own strengths

When the recruiting companies assess PhD graduates compared with MSc graduates with three years' relevant work experience, they emphasize that the PhD graduates have research competencies for a development-oriented approach, and to some extent their specialized in-depth subject knowledge. PhD graduates are thus preferred for research and development assignments and for specialist/expert functions.

MSc graduates with three years' relevant work experience are found, on the other hand, to distinguish themselves through a broader, but less deep expertise, which means they can take on more varied job functions, provided they do not need to apply specialist knowledge. The broad knowledge and relevant work experience make them suitable for operational tasks. According to the recruiting companies, their work experience often means that they have more experience with project management, so they meet deadlines and know how to manage the financing of a project.

As I mentioned earlier, the PhD graduate has the advantage of being able to go in depth, analyse a complex problem, and explain it. The MSc graduate with experience knows how to get on with others in a company in business. I would only choose a PhD graduate when I have a specific position that requires a capacity for in-depth analysis. Otherwise, I can find an adequate and more dependable employee who is an MSc graduate.

(Major recruiting company in the electricity, gas, and district heating sector)

6. INTERNATIONALIZATION—AT HOME AND ABROAD

This section of the survey examines the graduates' experience of the international dimension of the PhD programme at DTU. Focus is on the graduates' international experience during their studies and on whether they generally regard DTU as an internationally oriented university. Finally, the recruiters' assessment of the importance of research trips abroad will be described.

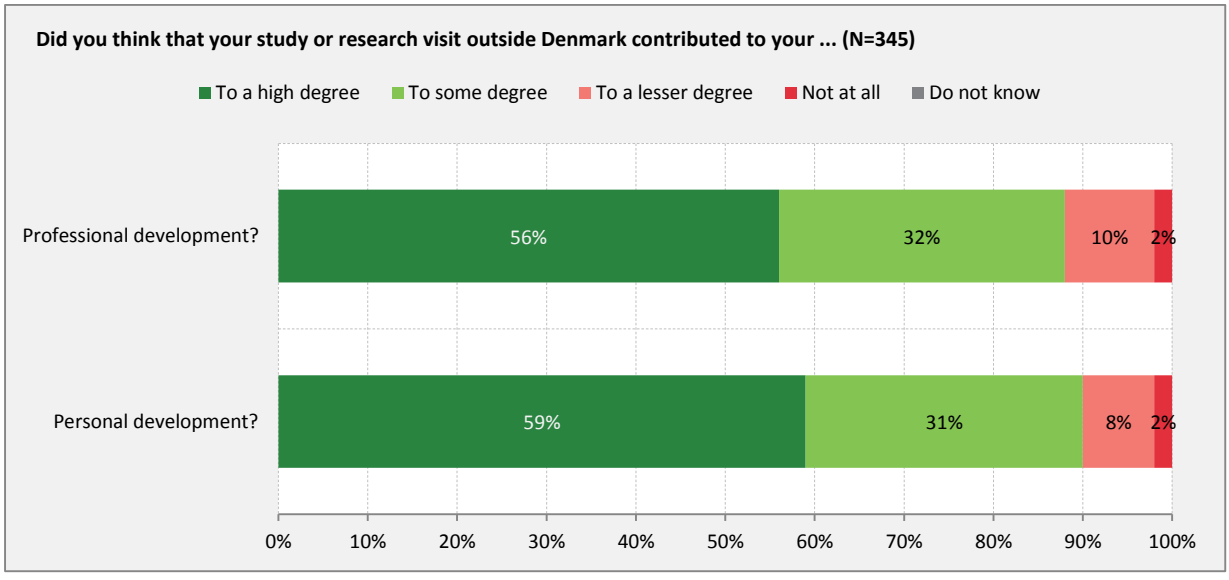
6.1 STUDYING ABROAD

Slightly more than half of the graduates have studied abroad during the PhD programme. This has contributed to their professional and personal development.

Slightly more than half (54%) of the graduates have studied or carried out research at a different university during their PhD programme. The Danish graduates have spent time at universities abroad to the same extent as graduates from other countries.

Graduates who have been abroad believe that it has contributed to their development, both professionally and personally. As can be seen from Figure 31, 56% believe that their visit abroad to a high degree has contributed to their professional development, while 32% consider it to be the case to some degree. Only 2% answer that their study abroad has not contributed at all to their professional development. Similarly, the majority of graduates believe that the visit abroad has contributed to their personal development, 59% consider it to be the case to a high degree while 31% consider it to be the case to some degree. Only 2% answer that this was not the case at all.

Figure 31: Did you think that your study or research visit outside Denmark contributed to your personal/professional development?



6.2 INTERNATIONAL NETWORKS AND COMPETENCIES

Three out of four graduates have formed international networks

The majority of graduates have been in contact with an international network and people with a different cultural background than their own during their PhD programme. This demonstrates the international environment at DTU.

83% of the graduates agree or strongly agree that they have obtained experience in collaborating with people with a different cultural background than their own through their PhD programme at DTU. Only 5% of the graduates disagree or strongly disagree while 11% neither agree nor disagree. Even among the Danish graduates who have not studied or conducted research at other universities outside Denmark, there are 75% who have worked with someone from a different cultural background.

Graduates have not only gathered experience of working with people from different cultural backgrounds, but have at the same time built up international networks through their PhD programme. Thus, the majority (75%) of all graduates agree or strongly agree that they have "*developed an international network through my PhD programme at DTU*". 8% of the graduates disagree or strongly disagree. 17% neither agree nor disagree.

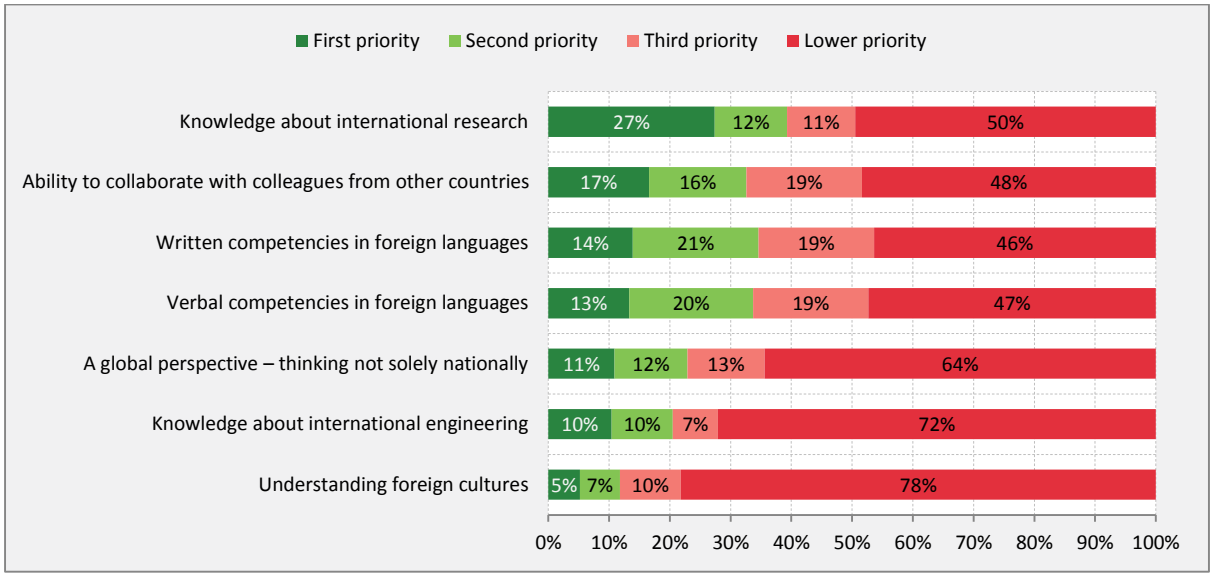
In light of the foregoing, it is not surprising that the majority of graduates find that DTU has an internationally oriented research environment. 84% agree or strongly agree with this, while only 3% disagree.

The priority of international qualifications

Graduates were asked to rank seven international and intercultural competencies according to importance in their current job. The results are partially illustrated in figure 32. In the figure, competencies are arranged in order of their average priority from 1-7, so that the competency which on average has the lowest score, and is thus given highest priority, is farthest to the left. The competencies which the graduates have given highest priority are *Ability to collaborate with colleagues from other countries* (3.5)*, Verbal competencies in foreign languages* (3.5)*, Knowledge about international research* (3.5) *and Written competencies in foreign languages* (3.6).

The largest number of graduates indicates *Knowledge about international research* as their first priority (27%). This applies especially to graduates who have worked with research at the universities, of whom 38% have chosen this as their first priority. If one compares the overall average score and the priority, the competence *Knowledge about international research* appears as particularly important among the 7 competencies. On average, there are fewest graduates who have given priority to *Understanding foreign cultures*, *Knowledge about international engineering* and *Global perspective—thinking not solely nationally*.

Figure 32: Rank the importance of the following 7 (international) competencies in carrying out your current job (or your latest job if you do not have a job at the moment).



6.3 RECRUITING COMPANIES FIND THAT RESEARCH VISITS ABROAD ARE A POSITIVE FACTOR

The recruiting companies experience that most PhD graduates have included a research visit abroad in their PhD programme at DTU. The recruiting companies therefore point out that they find it difficult to describe how the PhD graduates benefit from this research visit abroad, since they cannot compare them with PhD graduates who have not been on a research visit abroad. With this reservation, the recruiting companies emphasize maturity as one of the primary benefits of the research visit abroad.

> *"Indeed, it makes a big difference that the PhD graduates have carried out research abroad, because when you 'buy' a PhD graduate, you get abilities first and foremost, but you also get the network they bring with them. When they have an international contact that comes with them, and it can be extremely valuable. (…) Laboratory equipment is also costly, and a network may give access to special equipment."*
>
> (Small recruiting company in another sector)

At the same time, there are very few of the interviewed recruiting companies that do not either have a department abroad or business partners or customers outside Denmark. This means that cultural understanding and language skills are central in their daily work. A number of the large companies employ PhD graduates and others from abroad, and the workplace is therefore in many ways multicultural. Thus, the PhD graduates have an advantage if they have already proven their ability to work with others in that kind of context.

A few of the recruiting companies who particularly seek high research expertise underline the importance of the visit abroad for research, since it results in a professional network, to which the recruiting company also gains access by employing a PhD graduate. This can be crucial for collaboration and for gaining access to research equipment.

It is an advantage for the PhD graduates to have been abroad, because it gives them a wider network and a different perspective. The perspective is all about how people work in other places, and they are familiar with entering into a dialogue with our partners in other countries and appreciating that they have different cultures at work. The engineering profession cross national borders, so we must also be internationally oriented.

(Small recruiting company in a university research institution)

In general, the recruiting companies emphasize that the visit abroad should have a professional objective, since the stay does not, in itself, outweigh less professional expertise.

7. PROGRAMME SCHEDULING, CAREER GUIDANCE, AND LEAVE

This chapter looks in detail at the graduates' PhD programme. First it describes the graduates' own opinions of the programme and their specific suggestions for what could be improved. Next, focus is on whether the graduates made use of guidance or leave during their PhD programme. Finally, it describes the recruiters' assessment of the possibilities for collaboration in connection with a PhD programme.

7.1 GRADUATES' SUGGESTIONS FOR IMPROVEMENTS

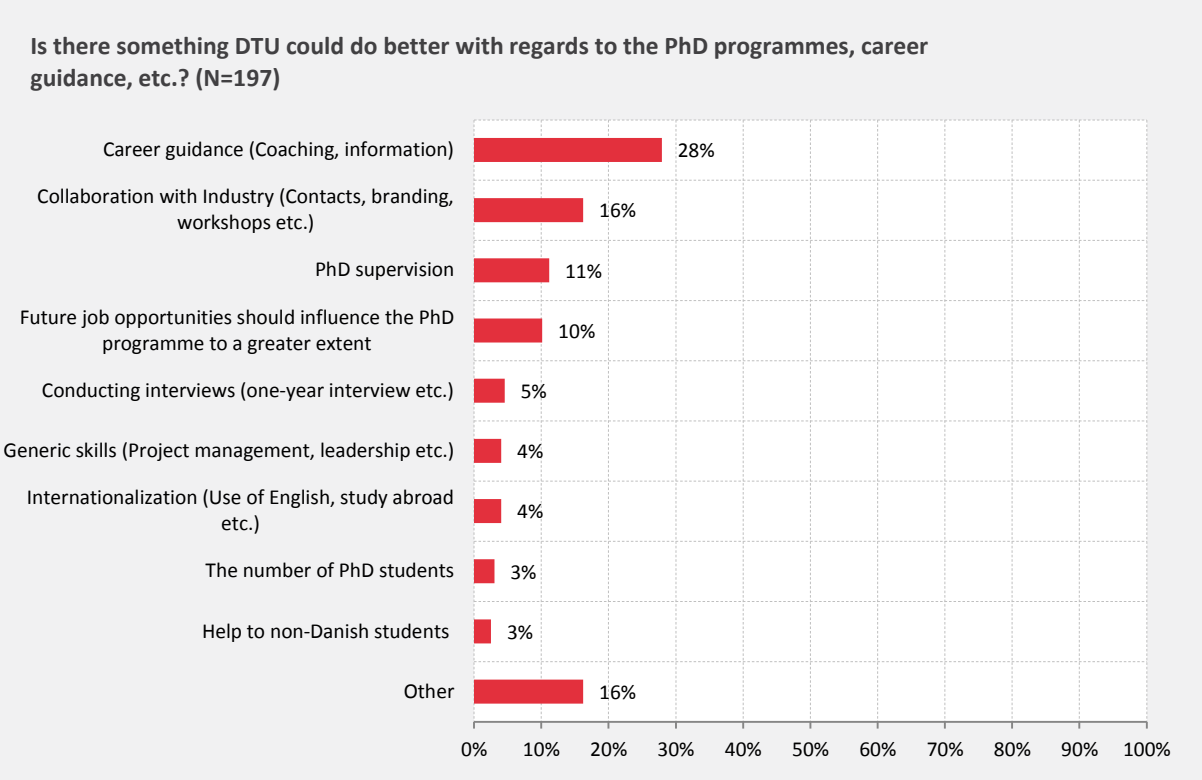
Graduates wish to be better prepared for a job in trade or industry

Graduates were given the opportunity to describe what they consider could have been better with regard to the PhD programme. Many different suggestions were put forward by the 197 graduates who chose to take advantage of this opportunity.

The comments show that a number of the graduates would like DTU to equip them better for jobs in business or industry after the PhD programme. As can be seen from figure 33, more than a quarter (28%) of the graduates' answers refer to the fact that career guidance during the PhD programme could be improved. Graduates would like the possibility of career guidance to be more visible, and several suggest that career guidance could be integrated to a greater extent in the PhD programme, for instance by obligatory career interviews. Correspondingly there is a smaller group (10%) who indicate that future job opportunities should influence the PhD programme to a greater extent. An additional group (16%) believe that DTU should collaborate more with business and industry in order to bring the PhD students closer to the recruiting companies.

In addition, there are a number of suggestions concerned with offering more instruction in general or generic skills, wishes for improvements in the PhD supervision procedures, and a reduction in the number of PhD students.

Figure 33: Is there something DTU could do better with regards to the PhD programme, career guidance, etc.?



Graduates would have appreciated more focus on communication, application of funds and project management

In the survey, more specific questions are asked about whether there are any types of competency or knowledge which the graduates did not gain in the course of their studies, which should have been included. 24% answered 'yes' to this. A quarter indicated that project management should have been included. An additional 15% mentioned more commercially oriented skills such as entrepreneurship and innovation (see Chapter 8). A further 9% answered that they would like to have acquired competencies in application for funding or writing a scientific proposal. Some of the graduates indicated that they would like to have acquired competencies in communications and presentation techniques (9%), while others mention collaboration and networks as areas where they would have liked to have acquired competencies to a greater degree.

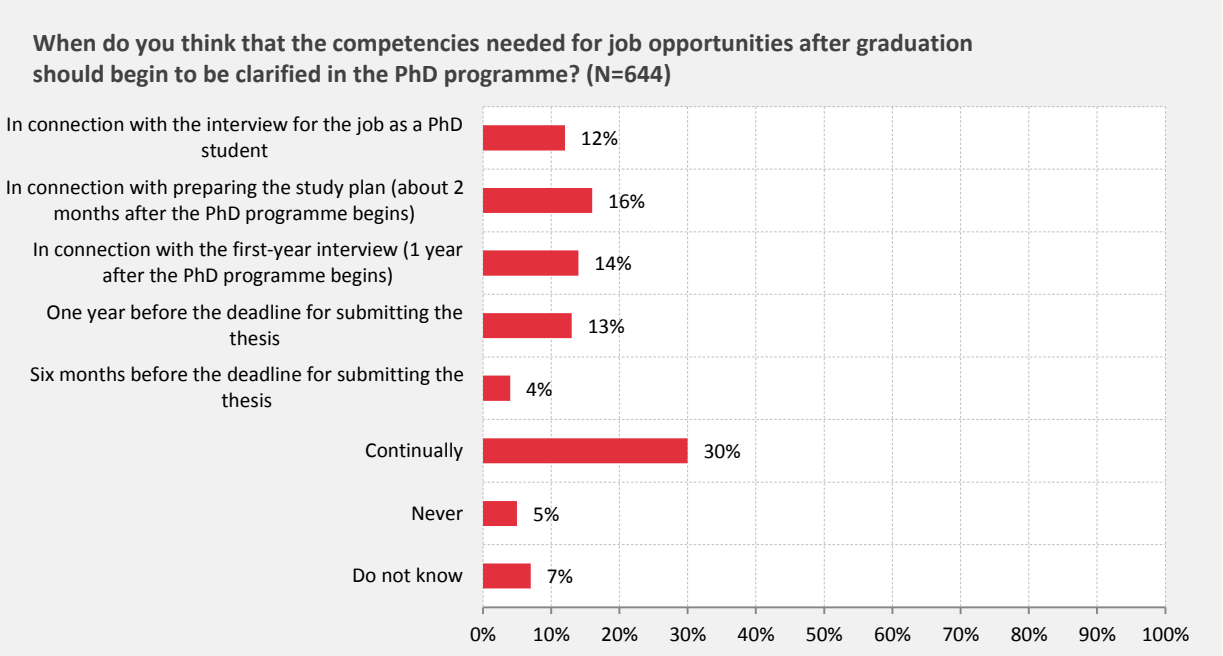
Graduates were also asked whether any of the knowledge or competencies they acquired in connection with their PhD programme have been irrelevant so far. In total, 12% of the graduates mentioned competencies which were irrelevant to them. Graduates who mention irrelevant competencies are predominantly those working outside university. They mention in particular subject-specific knowledge (36%), research competencies (12%), and teaching (5%).

7.2 CAREER GUIDANCE, COACHING, AND LEAVE

Career and competence guidance during the PhD programme

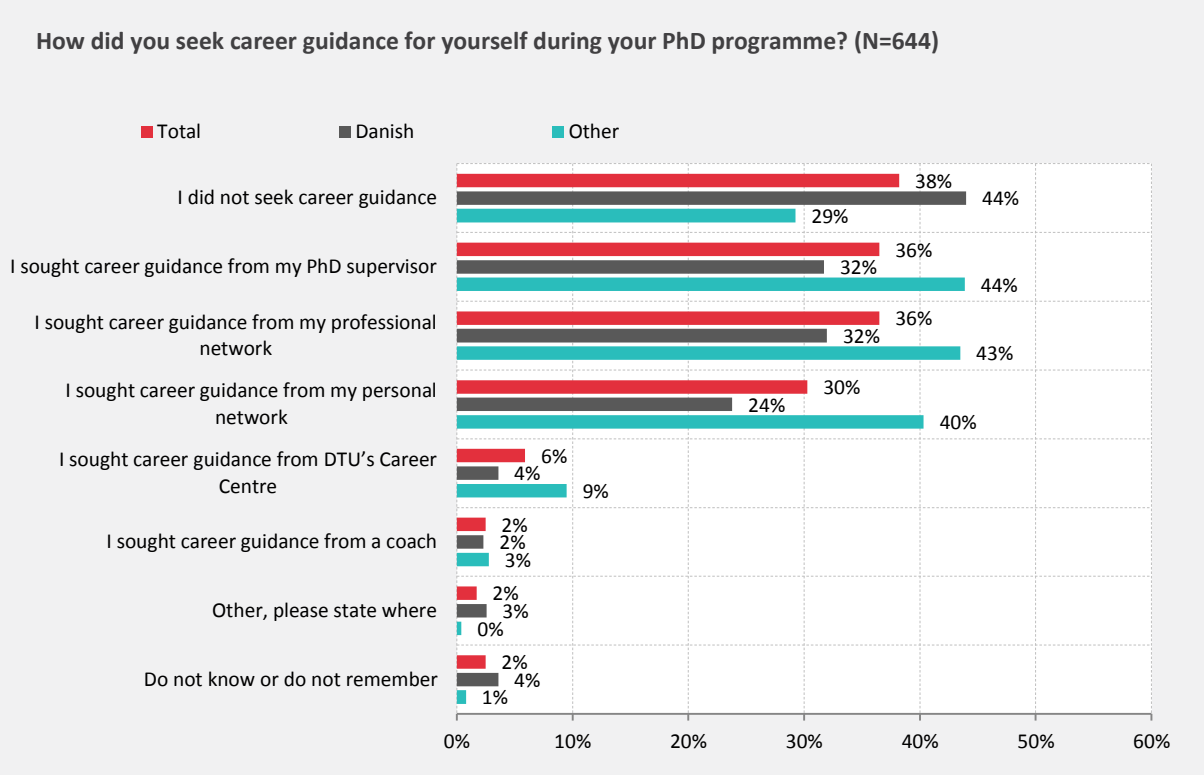
As shown in Figure 34, there is considerable scatter in the graduates' opinions of when students should begin to clarify which competencies are necessary for future jobs. Just under a third believe that this should be before the start of the PhD programme or early on; just under one third believe that it should be between one year after the start of the programme and six months before the thesis is submitted, and just under a third believe that it should be an ongoing process. Thus, there are apparently highly varied and individual needs.

Figure 34: When do you think that the competencies needed for job opportunities after graduation should begin to be clarified in the PhD programme?



On investigating whether graduates sought career guidance, (cf. Figure 35), it can be seen that 38% did not seek career guidance during their PhD programme. Graduates who did seek career guidance did to primarily through their professional networks (36%) or their PhD supervisor (36%). 30% also used their personal networks. In comparison, only a few graduates sought career guidance from a coach (2%) or at the DTU career centre (6%). In general, Danish graduates seek less guidance than graduates from other countries do.

Figure 35: How did you seek career guidance for yourself during your PhD programme?



Note: Percentages add up to more than 100%, since respondents were allowed to give more than one answer.

The survey shows that Danish students sought career guidance to a lesser extent than students from other countries. In that connection, 44% of the Danish students did not seek career guidance, compared with 29% of the students from abroad. Thus, the students from abroad are more likely to make use of all the options available to obtain career guidance.

Some of the students have seen a coach during their PhD programme

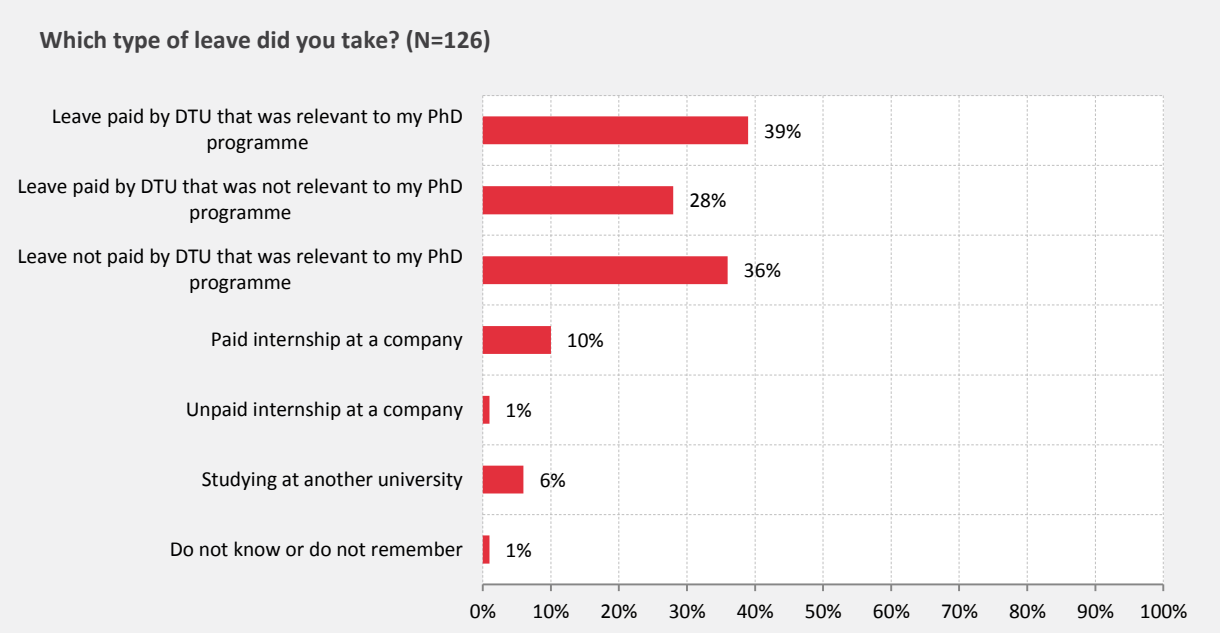
18% of all graduates consulted a coach at DTU during their PhD programme. Additionally, 4% had a coach outside DTU. The percentage of students from abroad (27%) who consulted a coach was higher than the percentage of Danish students who had a coach (12%). There was also a tendency for those who had a coach during their PhD programme to pursue a career in the university world to a greater extent than those without a coach.

Apart from parental leave, one in five students have taken leave during their PhD programme

20% of the graduates state that they took leave that was neither maternity leave nor parental leave during their PhD programme.

Figure 36 illustrates that for the majority of those who took leave (67%), it was paid for by DTU. More than a third of the graduates (36%) have also taken leave that was relevant to their PhD without payment from DTU, and 10% have had paid work experience with a company.

Figure 36: Which type of leave did you take?



Note: Percentages add up to more than 100%, since respondents were allowed to state more than one type.

Finally, the graduates were asked whether they had acquired competencies during their leave which have been relevant in their career so far. 50% of the graduates indicate that they acquired competencies during their leave, which have been relevant. In contrast, 31% answer that they acquired competencies that have not been relevant, while 19% do not know or cannot remember.

Looking more closely at the competencies acquired by graduates during their leave, it appears that competencies associated with research or with the field of research for their own PhD are the most common. A number of graduates have also gained experience of project work and project management during their leave. Finally, competencies in teaching, Danish, and knowledge of companies are mentioned.

7.3 THE RECRUITERS SEE GOOD OPPORTUNITIES FOR COLLABORATION IN CONNECTION WITH THE PHD PROGRAMME

A number of the recruiting companies enter into collaboration with PhD students. The recruiting companies gain several advantages from this collaboration.

> *"We have several collaborations with PhD students because it makes sense to take in expertise when we ourselves do not have the time or competencies."*
>
> (Major recruiting company in the production sector)

Collaboration on a PhD project obviously brings new development and knowledge to the company, enabling it to go in depth in a field for which there would not otherwise be resources or funds. It also brings value to the companies in that they can have products and processes developed and gain new resources in the form of knowledge and/or competencies that would not otherwise be at their disposal. As two major Danish recruiting companies explain; it is an advantageous channel for recruitment, where for example the company can actively make allowances for some of the minor challenges associated with the starting phase referred to in section 4.4, and secure a PhD graduate who matches well with the company. As one recruiting company states: *"We collaborate constantly with PhD students. There are several reasons: one is that it allows us to look at candidates for recruiting purposes."* (Small recruiting company in another sector)

A third advantage is the possibility of collaboration provided by a PhD project in connection with the costs of a project. Collaborating with a PhD brings value to the company, for example allowing it to go in depth with projects that it would not otherwise have resources for. As one recruiting company explains: *"It is a way of financing projects (…) We tend to place our resources where there is a return on the investment."* (Major recruiting company from the production sector).

However, not all the recruiting companies have equally good experiences of collaboration on a PhD project. A few of the companies have in particular faced challenges, either because they had insufficient control over the direction taken by the project, or because they found it a far greater responsibility than they had expected. The recruiting companies who have experienced challenges in collaboration with a PhD student were chiefly looking for strategic discussions and exchanges of ideas with DTU, and partly expecting to have more control over the direction taken by the project. As one recruiting company states: *"It is true, our experience was rather mixed—we would have liked a more vigorous strategic discussion from DTU's side. We found we were taking a far greater responsibility than we expected, but on the other hand we reaped a very clear advantage in the form of relevant knowledge."* (Small recruiting company in the liberal, scientific, and technical service sector).

8. CONTINUING EDUCATION

The survey also investigated whether graduates have taken part in continuing education and whether they are interested in continuing education in the future. The results are presented in this chapter.

8.1 PARTICIPATION IN CONTINUING EDUCATION

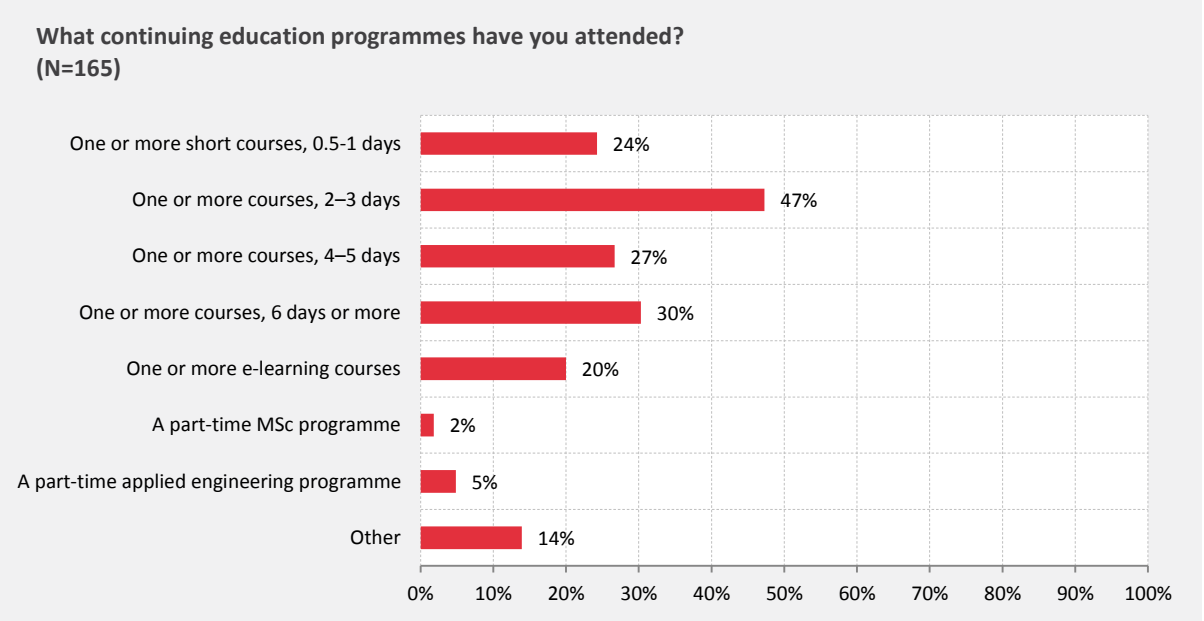
Approximately one in four have been on a continuing education programme

Overall, about a quarter of the graduates (26%) have either completed or are taking a continuing education course. This applies both to graduates employed at and outside universities.

Not surprisingly, the number of graduates who have completed or are taking continuing education courses increases as time passes after they completed their PhD programme. Among those who completed their programmes in 2010 and 2011, the figures are 39% and 32%, respectively, while among most recent graduates (2014), the figure is only 15%.

The courses taken by graduates are predominantly short courses rather than long part-time courses (cf. Figure 37). About a fifth of the graduates who have taken continuing education programmes have followed e-courses. A significantly larger number of graduates from abroad (31%) have taken courses than Danes (16%).

Figure 37: What continuing education programmes have you attended?



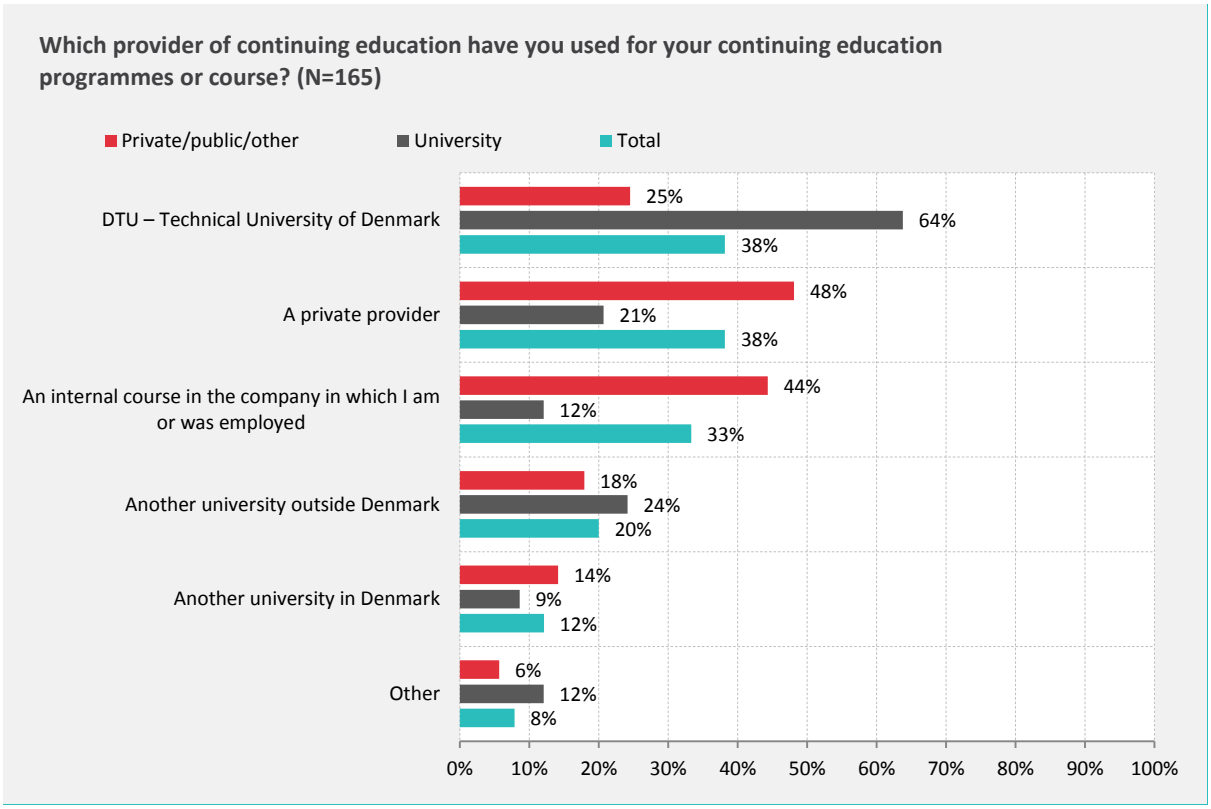
Note: Percentages add up to more than 100%, since respondents were allowed to state more than one programme.

DTU is the single largest provider of continuing education for graduates

38% of the graduates who have taken continuing education have taken a course at DTU. The survey shows that the graduates who work or have worked at a university name DTU as their preferred provider of continuing education. Out of these, 64% have taken their continuing education at DTU. Conversely, those who are employed in places other than a university have chiefly made use of private providers or taken continuing education in the companies where they work. Here only 25% of those who have taken continuing education have done so at DTU.

Similarly, 38% have taken their continuing education through private providers. 48% of the graduates working outside the universities have used private providers.

Figure 38: Which provider of continuing education have you used for your continuing education programmes or courses?



Note: Percentages add up to more than 100%, since respondents were allowed to give more than one answer.

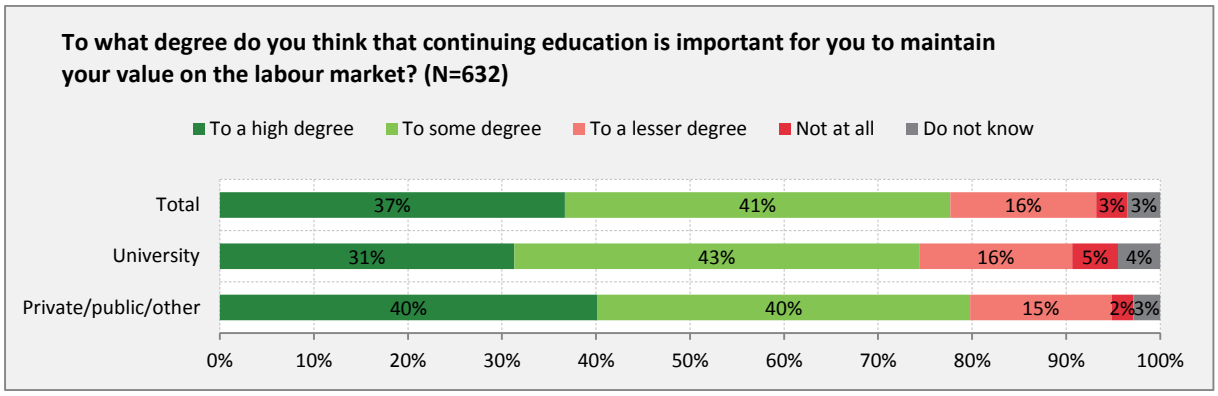
Graduates have primarily taken continuing education in project management (43%), their own research field (38%) or a completely new research field (22%). The proportion of people with continuing education who have taken it in their own research field is smaller (33%) among employees at universities than among employees in public or private businesses outside universities (42%).

8.2 THE VALUE OF CONTINUING EDUCATION

The majority of the graduates believe that continuing education is important for them to maintain their value in the labour market.

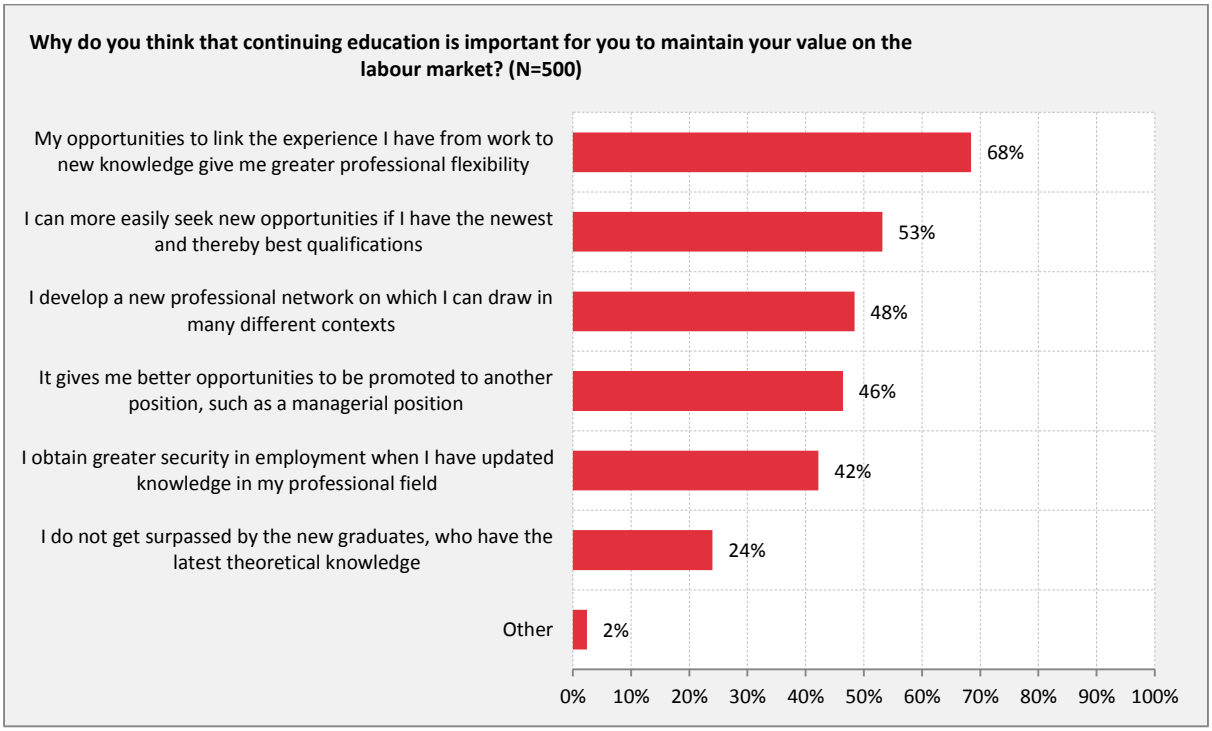
78% of all graduates believe that continuing education is to a high degree important or to some degree important to enable them to maintain their value on the labour market. One in five considers that continuing education is only to a lesser extent important for maintaining their market value, while a few (3%) consider it of no importance at all.

Figure 39: To what degree do you think that continuing education is important for you to maintain your value on the labour market?



The graduates who answered that it was important to take continuing education courses were asked why. The answers are shown in Figure 40. As can be seen, the majority (68%) point out that the possibility of bridging their work experience and new knowledge gives them greater professional flexibility.

Figure 40: Why do you think that continuing education is important for you to maintain your value on the labour market?

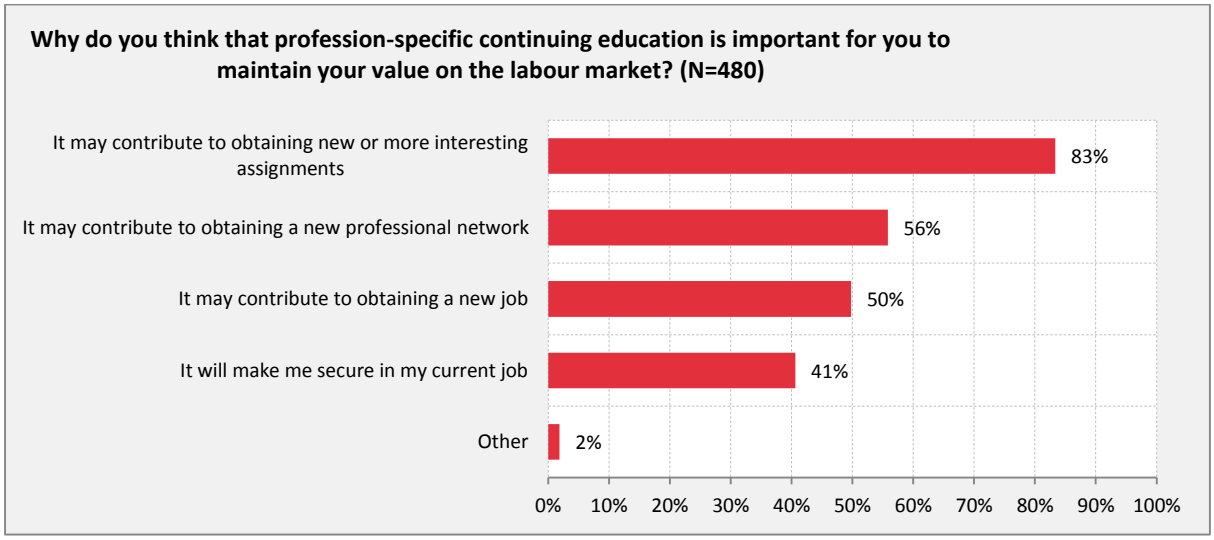


Note: Percentages add up to more than 100%, since respondents were allowed give more than one answer.

Many believe that profession-specific training is of great importance as well

Most graduates also believe that subject-specific continuing education is important in order to maintain their value on the labour market. 74% believe that this is to a high degree or to some degree the case. The reasons for the importance of subject-specific continuing education are shown in figure 41. Here, as many as 83% answer that subject-specific continuing education helps to secure new and more interesting assignments at work.

Figure 41: Why do you think that continuing education is important for you to maintain your value on the labour market?

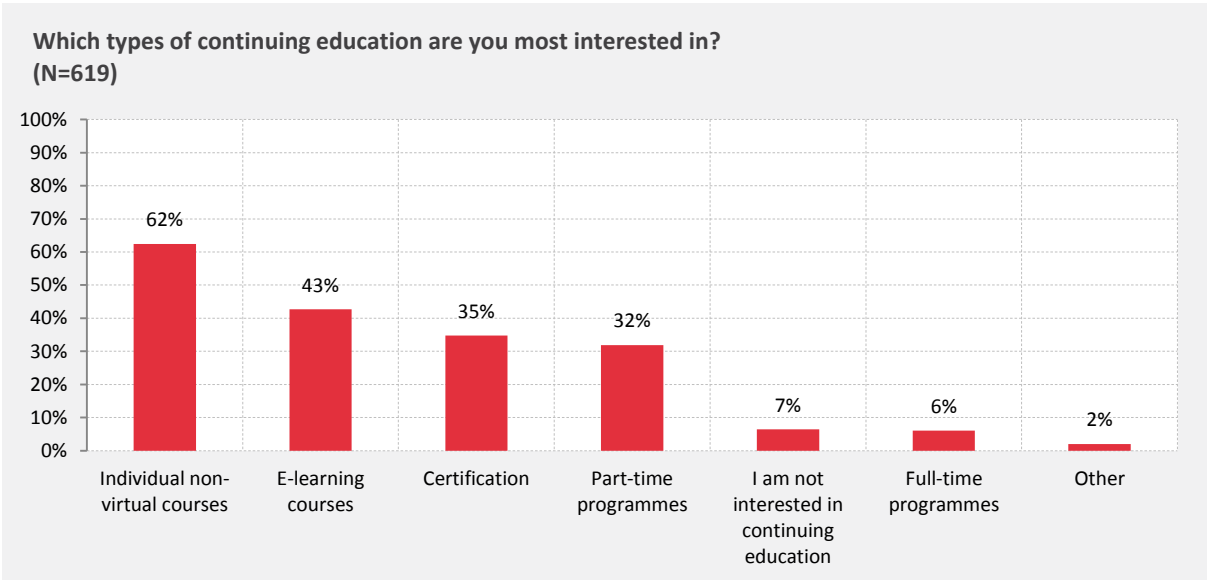


Note: Percentages add up to more than 100%, since respondents were allowed to give more than one answer.

Graduates are most interested in individual non-virtual courses

As can be seen from Figure 39, 62% of the graduates have answered that they are most interested in individual (non-virtual) courses. This applies especially to those employed outside universities (67%). At the same time, there is a significant proportion (43%) who indicates that e-learning is also of interest. Graduates from abroad are particularly interested in e-learning. Among Danes, 36% consider it of interest, while 54% of those from abroad share this opinion.

Figure 42: Which types of continuing education are you most interested in?



Note: Percentages add up to more than 100%, since respondents were allowed to give more than one answer.

9. INNOVATION, ENTREPRENEURSHIP, AND PATENTS

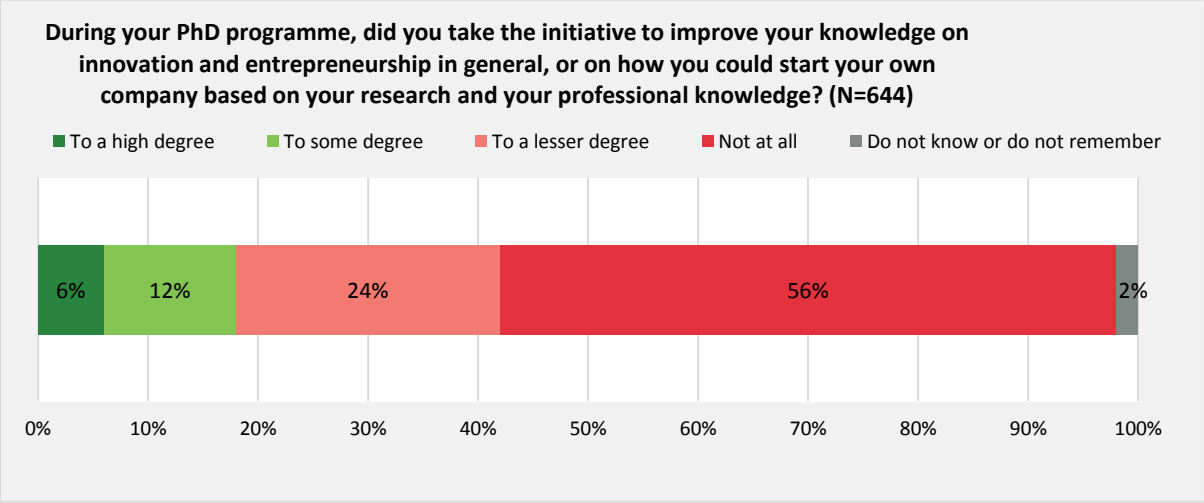
One way in which graduates are able to increase their value on the labour market after their PhD programme is by working closely with industry and developing their competencies in innovation and entrepreneurship. This chapter investigates how many of the graduates have worked with companies on their PhD projects. An account is given of how many graduates have taken an initiative to gather knowledge about innovation, entrepreneurship or starting up own business.

Around half the graduates have collaborated with trade or industry in connection with their PhD projects

In connection with their PhD projects, 43% of graduates have collaborated with trade or industry. Disregarding the industrial PhDs—which amount to 43 (9%) individuals in this survey—39% of the remaining graduates have worked with industry in connection with their PhD.

Far fewer of the graduates have taken the initiative to gain knowledge about innovation, entrepreneurship or how to start one's own business. As can be seen from Figure 43 below, about 56% of the graduates did not show any initiative at all to strengthen their knowledge of innovation, entrepreneurship or to establish a business based on the research or knowledge they had acquired in connection with their PhD. When looking only at industrial PhD graduates about 42% did not show any initiative at all to strengthen their knowledge of innovation, entrepreneurship or to establish a business based on the research or knowledge they had acquired in connection with their industrial PhD.

Figure 43: During your PhD programme, did you take the initiative to improve your knowledge of innovation and entrepreneurship in general, or on how you could start your own company based on your research and your professional knowledge?



Even though only a few started their own company, this does not mean that graduates were not innovative or creative during their PhD studies. Thus, 11% of the graduates have developed technology, software, etc. which has been patented. The most innovative were the 43 industrial PhD students; more than a quarter of them (26%) developed a product that was patented.

The degree of focus on innovation, entrepreneurship, and collaboration with industry varies between different fields of study

On closer examination, the degree of collaboration with industry varies across the PhD graduates' fields of study.

Graduates who have taken a PhD in Construction, Production, Building and Transport tend to work with industry to a greater extent than other fields of study during their PhD programme. More than half (54%) the graduates in this area have collaborated with industry (50% if the industrial PhDs are disregarded). This is marginally more than in Electronics, Communications and Space Research, and in Chemistry, Biotechnology and Chemical Technology, where 42% and 49% respectively have worked with industry. Finally, the proportion is lower in Life Science (32%) and Mathematics, Physics and Informatics (32%). This does not seem to affect the later employment of the graduates; hence approximately the same proportion of graduates are employed in industry across the different fields of study.

Likewise, there is a difference in the extent to which the graduates themselves have taken the initiative to strengthen their knowledge of innovation, entrepreneurship, or setting up a company. 64% within the fields of Electronics, Communications and Space Research have taken the initiative in one form or another to improve their knowledge of innovation and entrepreneurship. In comparison, between 28% and 46% of the graduates in the other fields of study took this kind of initiative during their studies.

Finally, 22% of the graduates from Electronics, Communications, and Space Research have developed patented products. In comparison, there were slightly fewer from Chemistry, Biotechnology, and Chemical Technology (16%) and significantly fewer from Construction, Production, Building, and Transport (7%), Mathematics, Physics, Informatics (7%), and Life Science (2%).

10. METHOD

10.1 QUANTITATIVE INTERVIEWS WITH GRADUATES

The quantitative survey among graduates was conducted in the period from 7 May to 6 June 2015. Initially—to the extent that a valid email address was available—the graduates received an email with an invitation and information about the survey, giving a unique link to a web-based questionnaire. Graduates for whom a valid email address was not available received a letter of invitation as far as a valid postal address was available. For a small group of graduates for whom neither valid email addresses nor postal addresses were available, attempts were made to invite them to the survey via LinkedIn.

During the survey period the graduates who had received an invitation by emails, but had not yet answered the questionnaire, received a further three reminder emails. After enrichment with telephone numbers on the basis of names and postal addresses, a telephone reminder was also implemented. During the whole of the survey period, the graduates were able to contact Epinion by telephone or email. Altogether, 644 graduates took part, which resulted in a total response rate of 44%.

Questionnaire and pilot test

DTU was responsible for drawing up the relevant questionnaire. After a joint working meeting, a few adjustments were made to the questions and answer categories based on Epinion's comments and recommendations. DTU translated the final questionnaire in order to enable the graduates to select their preferred language. The questionnaire was subsequently converted to a web-based setup using Epinion's SPSS-Dimension/IBM-platform, and the project manager in charge finally carried out a thorough manual quality check of the conversion. DTU also took part in the manual quality check of the conversion via a test link.

As additional quality assurance, Epinion carried out a pilot test involving nine graduates. Immediately after they had completed the questionnaire, the consultant in charge called the pilot participants and asked them about their experience of answering the questionnaire. The aim of the pilot test was to ensure that the questionnaire was unambiguous and that there were no difficulties in understanding the way individual items were formulated—such as the competencies which graduates were asked to give opinions of in the questionnaire. Based on the results of the questionnaire, a short memo was prepared, which gave rise to a few adjustments in the final questionnaire.

Obtainment and participant basis for mailing

After entering into a written contract for processing the data, DTU delivered a population extract to Epinion. The population extract included information on all graduates from DTU's PhD programme in the years 2010 to 2014. Besides details of names, addresses, gender, nationality, department, programme selection, and type of study, the population extract also included contact details in the form of email addresses and postal addresses to the extent that these were accessible. Since the

survey was conducted as a population survey, the population extract served at the same time as the participant basis for mailing the survey. An overview of the participant basis for mailing used in the survey, the form of contact and the obtainment is shown in Table 1 below.

Table 2. Overview over basis for mailing, including contact form and obtainment

Form of contact	*Population*	*Obtainment*	*Obtainment (pct.)*
Graduates invited via a valid email address	1,235	612	50
Graduates with none or invalid email address	221	32	14
Total	*1,456*	*644*	*44*
Graduates invited via a valid postal address	149	23	15
Graduates with none or invalid postal address	72	9	13
Total, graduates with invalid email address or none	*221*	*32*	*14*
Graduates invited via manual enrichment with email address	27	7	26
Graduates invited via manual enrichment with LinkedIn profile	26	2	8
Graduates who were not invited	19	0	0
Total, graduates with invalid postal address or none	*72*	*9*	*13*
Graduates whose postal invitation was returned	19	0	0
Total, excluding graduates not invited and returned invitations	*1,418*	*644*	*45*

Source: Epinion for DTU—Graduate Survey, 2015

As can be seen from Table 2 above, DTU's population extract contained information about a total of 1,456 graduates. Out of these, 1,235 graduates appeared with valid email addresses, while 149 of the remaining 221 graduates appeared with valid postal addresses. By means of manual enrichment it was possible to find a valid email address for a further 27 of the remaining 72 graduates, while 26 were invited to take part in the survey via LinkedIn. There were 19 graduates for whom it was not possible to obtain valid contact information. In addition to these, 19 postal invitations were returned on the grounds of *not known at this address, has moved away, etc*.

Full answers were obtained from 644 graduates in total. When obtainment is compared with the gross population, i.e. the total population of 1,456 graduates, the response rate obtained was 44%. If obtainment is compared with the net population, i.e. the total population excluding the 19 graduates who were not invited and the 19 graduates whose postal invitation did not reach them, the response rate obtained was 45%. Thus, regardless of whether the obtainment is compared with the gross or the net population, a satisfactory response rate was achieved, on a level with other surveys of the same nature.

Representativity and non-response analysis

A satisfactory response rate is not necessarily synonymous with satisfactory data quality. Even when an unusually high response rate can be assumed, systematic differences may arise between the population and the data obtained, which affects the representativity of the survey. In other words, if one sub-population is over-represented at the expense of others, the answers from the over-represented population may have a disproportionate effect on the results of the survey. In this connection, for instance, the graduates from one year might be over-represented at the expense of graduates from other years, and—assuming there were systematic differences between the over-represented year and the other years—would have a disproportionate effect on the result of the survey. Besides the years of graduation, it would be reasonable to test the representativity for background characteristics such as gender, selection of programme, type of study, and nationality. An overview of the differences between the population and the data obtained in relation to these particular characteristics is given in Table 2 below.

Table 3. Summary of population and obtainment

Background characteristics	*Population*	*Population (pct.)*	*Obtainment*	*Obtainment (pct.)*	*Difference (percentage points)*
Gender					
Man	1,003	69	447	69	1
Woman	453	31	197	31	-1
Total	*1,456*	*100*	*644*	*100*	*0*
PhD graduation date					
2010	241	17	131	20	4
2011	274	19	113	18	-1
2012	299	21	121	19	-2
2013	320	22	128	20	-2
2014	322	22	151	23	1
Total	*1,456*	*100*	*644*	*100*	*0*
Programme selection					
Electronics, communications, and space research	309	21	122	19	-2
Chemistry, biotechnology, and chemical technology	344	24	147	23	-1
Construction, production, building, and transport	326	22	157	24	2
Life sciences	241	17	111	17	1
Mathematics, physics, and informatics	236	16	107	17	0
Total	*1,456*	*100*	*644*	*100*	*0*
Type of study					
Industrial PhD	122	8	58	9	1
Other	1,334	92	586	91	-1
Total	*1,456*	*100*	*644*	*100*	*0*
Nationality					
Danish	769	53	391	61	8
Other	687	47	253	39	-8
Total	*1,456*	*100*	*644*	*100*	*0*

Source: Epinion for DTU—Graduate Survey, 2015

As can be seen from Table 3 above, there is generally good correlation between the percentages in the population and the data obtained. When background characteristics such as *gender*, *programme selection,* and *type of study* are examined, the differences are limited to between one and two percentage points, which is highly satisfactory. In relation to the background characteristic *PhD graduation date* a slight overrepresentation of graduates from 2010 appears at the expense of graduates from 2011, 2012 and 2013. In relation to the background characteristic *nationality* there also appears to be a slight over-representation of Danish graduates at the expense of graduates of

other nationalities, i.e. graduates from abroad. The differences between the proportions in the population and in the data obtained for the last two background characteristics mentioned must thus be kept in mind when reading the report. In the attached table-form report there are cross tabulations for all survey questions and in particular for the background characteristics *PhD graduation date* and *nationality*.

10.2 QUALITATIVE INTERVIEWS WITH RECRUITING COMPANIES

Against the background of the questionnaire survey among PhD graduates, Epinion carried out 44 qualitative in-depth interviews with those responsible for recruitment or day-to-day managers of the PhD graduates employed at relevant recruiting companies of PhD graduates from DTU. The qualitative in-depth interviews contribute to the insight into how and to what extent the PhD programme at DTU lives up to recruiting companies' requirements for competencies. Recruiting companies were specifically asked what they consider important when they employ PhD candidates, focusing on which specific competencies recruiting companies are looking for. Next we examined the recruiting companies' view of the competencies of PhD graduates from DTU, investigating specifically which relevant engineering or research competencies or which more general or personal competencies (e.g. project management, ability to collaborate etc.) the PhD graduates possess, and which they lack.

The qualitative in-depth interviews were carried out as semi-structured interviews, in which the interview guide used is structured like a funnel. The recruiting companies were first asked open questions, leading to the specific themes, and then more direct questions, with the focus on answering the survey questions (see the interview guide in the appendix) which were intended to uncover specific hypotheses, drawn to some extent from the quantitative survey of graduates. This approach ensured that we identified the focal points of the survey and its specific hypotheses, but at the same time were aware of new tendencies that are not identified in the previously formulated hypotheses. The survey thus opened the way for eye-opening findings. In addition, the structured part of the interview guide ensured that all relevant themes were treated in the same way in all interviews. This referred, for instance, specifically to which competencies the recruiting companies found that PhD graduates possess compared with MSc graduates. The questions were formulated in advance, but there was still scope for clarifying questions that arose in the specific interview situations.

The interview guide was drafted by Epinion based on the assignment and results of the questionnaire survey among graduates. DTU provided input for the draft, which was subsequently included in the final interview guide.

Qualitative consultants from Epinion interviewed recruiting companies across company sizes and sectors. The total number of interviews with recruiters was divided between three interviewers. Thus, the acquired knowledge was kept between a limited number of people, giving depth and effectiveness to the reporting. The consultants carried out a joint briefing before and after the interviews. The briefing before the interviews ensured a common approach and implementation of the recruiter interviews, where for example the precise interview technique was determined. The debriefing

ensured transparency and inclusion of tendencies and relevant points from all the interviews carried out, and contributed to a united approach in the reporting phase.

The qualitative in-depth interviews with the recruiting companies were held in the period from 10 June to 2 July 2015. The interviews took the form of telephone interviews, with the qualitative consultant writing down interview notes simultaneously, while dictaphone recordings of the interviews were taken. At the end of each interview, the qualitative consultant wrote out the interview notes with clarifying points and any details only written in note form during the interview, with the sound recording as support. The sound files were treated as confidential and deleted after the report was delivered.

Recruitment strategy

The participants for interviews were selected from the questionnaire survey, where graduates could state their current workplaces and the name of a superior. Epinion has attached importance to interviewing primarily day-to-day managers who are close to the graduates in work situations rather than specialized HR consultants, since the managers are more in touch with which competencies the graduates make use of, and how the competencies match overall with the recruiting companies' requirements.

The selection of recruiting companies targeted both large and small companies in relevant sectors (see the table below). Several interviews were held with recruiting companies in priority sectors, which were defined in collaboration with DTU. Within the prioritized sectors, a spread in company sizes was sought. These choices were made to ensure a broad distribution of types of recruiting companies to be interviewed. Only recruiting companies with headquarters or branches in Denmark were selected.

Recruiting companies were therefore selected on the following criteria:

- A number of the largest and most outstanding recruiting companies, such as NOVO, Lundbeck, DTU, Rambøll, and others.
- Large and small companies in each of the prioritized sectors
- Large and small companies in other sectors

The selection of recruiting companies ensured a 'saturation' in the interviews, so that against the background of these interviews there was a suitable weight of statements with regard to overall tendencies in company sizes and sectors. The universities and research institutes have been included as a sector in the study, since they are major recruiters of PhD graduates, and because they contribute extensively to the quality assurance and development of the PhD programme. These choices ensure a broad distribution of types of recruiting companies for the interviews.

Table 4. Overview of sectors and sizes of recruiters, qualitative interviews

Sectors	Size		
	Total	200 employees or more	199 employees or less
Production company (including production in the chemical and biotech areas)	7	6	1
Liberal, scientific, and technical services	10	6	4
Universities / research institutions	10	7	3
Electricity, gas and district heating	4	3	1
Building and construction companies	6	5	1
Other sectors	7	3	4
Total	44	30	14

The report refers to the industries shown in table 4. To indicate the size of the recruiting companies, recruiting companies with 200 employees or more are called 'major recruiting companies', while recruiters with 199 employees or less are called 'small recruiting companies'.

Epinion has achieved the desired distribution of recruiting companies by means of invitation from the graduate questionnaire, where graduates have been able to name their current workplace and give the name of a manager. In addition, the distribution has been ensured by recruiting from DTU's panel of recruiting companies.

List of participating recruiting companies taking part in qualitative interviews

- Advance CleanTech
- Alectia A/S
- Bioneer
- Capgemini
- cBrain
- Chr Hansen
- Comsol
- COWI
- Danfoss
- Danish Power System
- Danish Veterinary Association
- DONG
- DTU Electrical Engineering
- DTU Food
- DTU Mechanical Engineering
- DTU Technology
- DTU Physics
- EKJ
- Energinet.dk
- Enfor
- Envidan
- Grontmij
- Grundfos
- H. Lundbeck
- Haldor Topsoe
- Herlev Hospital
- IRD
- Kirkholm Maskiningeniører
- Krüger
- City of Copenhagen, Technical and Environmental Administration
- Lloyd's Register
- Microsoft
- NIRAS
- NOV Flexibles
- Novo Nordisk
- Orbicon
- Qeye Labs
- QuantomWise
- Rambøll
- Roskilde Katedralskole
- Siemens Windpower
- SiOx
- Danish Technological Institute
- Widex

APPENDIX 1: QUESTIONNAIRE—GRADUATE SURVEY

The PhD graduates could choose between a Danish and an English version of the questionnaire, below is the English version.

Introduction

Thank you for participating in this 2015 survey of DTU graduates. This will take about 20 minutes. The survey asks about what you thought about employment while you were in your PhD programme and about your subsequent employment situation. The last questions in the survey focus on your opinions about the competencies you acquired during your PhD programme. The results of the survey will comprise an important part of the task of developing the PhD programme at DTU, and your participation is therefore very important to us. Your responses will be treated confidentially, and your participation is anonymous. If you have questions about the survey, please send an email to mailto:dtu@epinion.dk. Click 'Next'' to begin the survey. Best regards, DTU and Epinion.

The questions in this section focus on your thoughts on future employment during your PhD programme and immediately after graduation.

1. To what degree did you consider which job or jobs your PhD education would lead to at the following times?

	To a high degree	To some degree	To a lesser degree	Not at all	Do not know or do not remember
Before I began the PhD programme	□	□	□	□	□
During the PhD programme	□	□	□	□	□
Right before I submitted my PhD thesis	□	□	□	□	□
Right after I submitted my PhD thesis	□	□	□	□	□

1.2 To what degree did your future employment considerations influence your choice of courses during your PhD programme?

- o To a high degree
- o To some degree
- o To a lesser degree
- o Not at all
- o Do not know or do not remember

1.3 To what degree did your future employment considerations influence how you otherwise organized your PhD programme?

- o To a high degree
- o To some degree
- o To a lesser degree
- o Not at all
- o Do not know or do not remember

2. When did you begin actively seeking employment?

- o Before I submitted my PhD thesis
- o After I submitted my PhD thesis but before the PhD defence
- o Less than 1 month after my successful defence
- o 1–3 months after my successful defence
- o More than 3 months after my successful defence
- o I was headhunted without actively seeking employment first
- o I became self-employed with my own company without actively seeking employment first
- o I began a new education programme without actively seeking employment first
- o I have not yet actively sought employment
- o Do not know or do not remember

[Only graduates who have not yet actively sought employment]

2.1 Why have you not yet actively sought employment?

- o State the reason:
- o Do not know or do not want to answer

3. Which of the following best describes your current employment situation?

- o I am employed (including part-time jobs, jobs with public salary subsidies and the like)
- o I am self-employed with my own company
- o I am unemployed
- o I am enrolled in a new education programme

[If Q3.ContainsAny({_1}) Then]

3.1 How many jobs did you have after you completed your PhD programme, but before you started your present job?

- o (_1) 0 (I have only had my present job)
- o (_2) 1
- o (_3) 2
- o (_4) 3
- o (_5) 4 or more

[elseif Q3.ContainsAny({_2}) Then]

3.2 How many jobs have you had after you completed your PhD programme, but before you started being self-employed with your own company?

- o (_1) 0 (My only employment has been my present self-employment with my own company)
- o (_2) 1
- o (_3) 2
- o (_4) 3
- o (_5) 4 or more

[elseif Q3.ContainsAny({_3}) Then]

3.3 How many jobs have you had since you completed your PhD programme?

- o (_1) 0
- o (_2) 1
- o (_3) 2
- o (_4) 3
- o (_5) 4 or more

[elseif Q3.ContainsAny({_4}) Then]

3.4 How many jobs have you had after you completed your PhD programme, but before you started a new education programme?

- o (_1) 0
- o (_2) 1
- o (_3) 2

- o (_4) 3
- o (_5) 4 or more

[end if]

[if Q3.ContainsAny({_1}) OR Q3_2.ContainsAny({_2,_3,_4,_5}) OR Q3_3.ContainsAny({_2,_3,_4,_5}) OR Q3_4.ContainsAny({_2,_3,_4,_5}) then]

The next questions focus on your first job after submitting your PhD thesis.

4. How much time elapsed between the time you submitted your thesis until you were hired for your first job (that is, signed an employment contract)?

- o (_1) I was hired before I submitted my PhD thesis
- o (_2) I was hired after I submitted my PhD thesis but before the PhD defence
- o (_3) I was hired less than 1 month after my successful defence
- o (_4) I was hired 1–3 months after my successful defence
- o (_5) I was hired 4–6 months after my successful defence
- o (_6) I was hired 7–12 months after my successful defence
- o (_7) I was hired more than 12 months after my successful defence
- o (_8) Do not know or do not remember

5. How many jobs did you apply for before you were hired for your first job?

- o (_1) 0 (I was hired without formally applying)
- o (_2) 1–5
- o (_3) 6–15
- o (_4) 16–30
- o (_5) More than 30
- o (_6) Do not know or do not remember

6. How important were the following factors for you being hired for your first job?

	Very important	Somewhat important	Slightly important	Not important	Do not know
My general PhD competencies	□	□	□	□	□
My competencies specific to my PhD field	□	□	□	□	□

My personal network (family, friends etc.)	□	□	□	□	□
My professional network (supervisors, company contacts through the PhD programme etc.)	□	□	□	□	□
Experience from research projects in collaboration with a company	□	□	□	□	□
Previous relevant job experience (after receiving the MSc degree)	□	□	□	□	□
The reputation of my PhD programme or DTU	□	□	□	□	□

7. How many years of relevant job experience (after you received your MSc degree) did you have when you began your PhD programme?

- o (_1) None
- o (_2) Less than 1 year
- o (_3) 1–2 years
- o (_4) 3–4 years
- o (_5) 5 years or more
- o (_6) Do not know or do not remember

[if Q2.ContainsAny({_1,_2,_3,_4,_5,_7,_8,_9,_10}) then]

8. How did you get your first job? (Check all the answers that apply)

- □ (_1) By applying for an advertised job
- □ (_2) Through my personal network (family, friends etc.)
- □ (_3) Through my professional network (supervisors, company contacts through my PhD programme etc.)

- ☐ (_4) Through a research project in collaboration with a company
- ☐ (_5) I was headhunted
- ☐ (_6) Through an uninvited application to an employer
- ☐ (_7) Through active public labour market measures (job with public salary subsidies, internship etc.)
- ☐ (_8) Other, please describe:
- ☐ (_9) Do not know or do not remember

[end if]

9. Where were you employed in your first job?

- o (_1) I was employed in the private sector
- o (_2) I was employed in the public sector
- o (_3) I was employed as a postdoctoral fellow, researcher or assistant professor at DTU
- o (_4) I was employed as a postdoctoral fellow, researcher or assistant professor at another institution than DTU
- o (_5) Other, please describe:

[if Q9.ContainsAny({_1,_2,_4,_5}) then]

10. Where was your fixed workplace in your first job?

- o (_1) Denmark
- o (_2) Other country, please state which:

[if Q10.ContainsAny({_1}) then]

10.1 In which administrative region in Denmark was the fixed workplace of your first job located?

- o (_1) Capital Region of Denmark (Region Hovedstaden)
- o (_2) Region Zealand (Region Sjælland)
- o (_3) Central Denmark Region (Region Midtjylland)
- o (_4) Region of Southern Denmark (Region Syddanmark)
- o (_5) The North Denmark Region (Region Nordjylland)

[end if]

[if Q10.ContainsAny({_2}) Then]

10.2 What factors were important for you in choosing to work outside Denmark?

- o (_1) Please state:
- o (_2) Do not know or do not remember

[end if]

11. Which company, institution or organization employed you?

- o (_1) Please state:
- o (_2) Do not want to answer

12. How many total employees does the company, institution or organization have?

- o (_1) 1–9
- o (_2) 10–49
- o (_3) 50–199
- o (_4) 200–500
- o (_5) 501–1000
- o (_6) 1001–5000
- o (_7) More than 5000
- o (_8) Do not know or do not remember

[end if]

13. In which economic sector was your first job? Please select the economic sector from the list in which your workplace primarily operates. The sectors are defined based on the Danish Industrial Classification used by Statistics Denmark.

- o (_1) Administrative and support service activities
- o (_2) Construction
- o (_3) Electricity, gas, steam etc.
- o (_4) Activities of extraterritorial organizations and bodies
- o (_5) Wholesale and retail trade; repair of motor vehicles and motorcycles
- o (_6) Manufacturing (including manufacturing within chemical or biotechnological industry)
- o (_7) Information and communication
- o (_8) Arts, entertainment and recreation activities
- o (_9) Agriculture, forestry and fishery
- o (_10) Knowledge-based services
- o (_11) Public administration, defence and compulsory social security
- o (_12) Financial and insurance
- o (_13) Consultancy etc.
- o (_14) Mining and quarrying
- o (_15) Human health and social work
- o (_16) Transportation

- o (_17) Education
- o (_18) University or research institution
- o (_19) Water supply, sewerage, waste management and cleaning of soil and subsoil water
- o (_20) Other service activities
- o (_21) Other, please state:

14. Which work tasks did you carry out in your job? (Check all that apply)

- ☐ (_1) Tasks specifically related to the PhD programme (such as food quality and safety, construction etc.)
- ☐ (_2) Administration (including accounting and secretariat functions)
- ☐ (_3) Data analysis
- ☐ (_4) Documentation
- ☐ (_5) Research
- ☐ (_6) Human resources
- ☐ (_7) Information
- ☐ (_8) Information technology tasks
- ☐ (_9) Chemical analysis
- ☐ (_10) Management or organization
- ☐ (_11) Middle or executive management
- ☐ (_12) Planning
- ☐ (_13) Production
- ☐ (_14) Product development or innovation
- ☐ (_15) Project management
- ☐ (_16) Consultancy
- ☐ (_17) Sales, marketing or advertising
- ☐ (_18) Service (including customer service)
- ☐ (_19) Teaching
- ☐ (_20) Other, please state:

15. In your first job, did you work with colleagues who had a master-level degree followed by 3 years of relevant job experience?

- o (_1) Yes
- o (_2) No
- o (_3) Do not know or do not remember

[if Q15.ContainsAny({_1}) then]

15.1 Did you think that you had acquired relevant competencies through your PhD programme that your colleagues who had a master-level degree followed by 3 years of relevant job experience did not have?

- o (_1) Yes, please state which:
- o (_2) No
- o (_3) Do not know or do not remember

[end if]

16. Did your first job require a PhD degree to carry out the work?

- o (_1) Yes, a PhD degree was required to carry out the work
- o (_2) No, it could also have been carried out by a person with a master-level degree followed by 3 years of relevant job experience
- o (_3) No, it could also have been carried out by a person who recently graduated with a master-level degree and no relevant job experience
- o (_4) Do not know or do not remember

17. To what degree were your PhD education and your first job related professionally?

- o (_1) To a high degree
- o (_2) To some degree
- o (_3) To a lesser degree
- o (_4) Not at all
- o (_5) Do not know or do not remember

[if Q17.ContainsAny({_4}) then]

17.1 Did you consciously choose your first job because the job and your PhD education were unrelated professionally?

- o (_1) Yes
- o (_2) No
- o (_3) Do not know or do not remember

[end if]

[end if]

18. To what degree are the following qualities important in a good job?

	Very important	Somewhat important	Slightly important	Not important	Do not know
Close to my home	□	□	□	□	□
Great job security (long-term employment)	□	□	□	□	□
An international environment	□	□	□	□	□
Job-related travel	□	□	□	□	□
Relevant to my education	□	□	□	□	□
The sector is relevant to my research	□	□	□	□	□
Relevant to my further career	□	□	□	□	□
High professional standards among colleagues	□	□	□	□	□
Good research facilities	□	□	□	□	□
Professional challenges	□	□	□	□	□
I can influence decision-making processes	□	□	□	□	□
Human resource management	□	□	□	□	□
Great responsibility	□	□	□	□	□
High salary	□	□	□	□	□

A good mental working environment	□	□	□	□	□
Good human resource policies	□	□	□	□	□
Work/Life balance	□	□	□	□	□
Opportunities for continuing education	□	□	□	□	□

19. Are there any other qualities you consider important in a good job?

- o (_1) Yes, please state:
- o (_2) No

[if Q3_1.ContainsAny({_2,_3,_4,_5}) OR Q3_2.ContainsAny({_3,_4,_5}) OR Q3_3.ContainsAny({_3,_4,_5}) OR Q3_4.ContainsAny({_3,_4,_5}) then]

The next questions focus on your current job, if you are employed. If you are unemployed, in an educational programme or self-employed with your own company, we ask you to answer based on your most recent job.

20. Where are you employed in your current job?

- o (_1) I am employed in the private sector
- o (_2) I am employed in the public sector
- o (_3) I am employed as a postdoctoral fellow, researcher or assistant professor at DTU
- o (_4) I am employed as a postdoctoral fellow, researcher or assistant professor at another institution than DTU
- o (_5) Other, please describe:

[if Q20.ContainsAny({_1,_2,_4,_5}) then]

21. Where is your fixed workplace?

- o (_1) Denmark
- o (_2) Other country, please state which:

[if Q21.ContainsAny({_1}) then]

21.1 In which administrative region in Denmark is the fixed workplace of your job located?

- o (_1) Capital Region of Denmark (Region Hovedstaden)
- o (_2) Region Zealand (Region Sjælland)
- o (_3) Central Denmark Region (Region Midtjylland)
- o (_4) Region of Southern Denmark (Region Syddanmark)
- o (_5) The North Denmark Region (Region Nordjylland)

[end if]

[If Q21.ContainsAny({_2}) Then]

21.2 What factors were important for you in choosing to work outside Denmark?

- o (_1) Please state:
- o (_2) Do not want to answer

[end if]

22. Which company, institution or organization are you currently employed by?

- o (_1) Please state:
- o (_2) Do not want to answer

23. How many total employees does the company, institution or organization have?

- o (_1) 1–9
- o (_2) 10–49
- o (_3) 50–199
- o (_4) 200–500
- o (_5) 501–1000
- o (_6) 1001–5000
- o (_7) More than 5000
- o (_8) Do not know or do not remember

[end if]

24. In which economic sector are you employed? Please select the economic sector from the list in

which your workplace primarily operates. The sectors are defined based on the Danish Industrial Classification used by Statistics Denmark.

- o (_1) Administrative and support service activities
- o (_2) Construction
- o (_3) Electricity, gas, steam etc.
- o (_4) Activities of extraterritorial organizations and bodies
- o (_5) Wholesale and retail trade; repair of motor vehicles and motorcycles
- o (_6) Manufacturing (including manufacturing within chemical or biotechnological industry)
- o (_7) Information and communication
- o (_8) Arts, entertainment and recreation activities
- o (_9) Agriculture, forestry and fishery
- o (_10) Knowledge-based services
- o (_11) Public administration, defence and compulsory social security
- o (_12) Financial and insurance
- o (_13) Consultancy etc.
- o (_14) Mining and quarrying
- o (_15) Human health and social work
- o (_16) Transportation
- o (_17) Education
- o (_18) University or research institution
- o (_19) Water supply, sewerage, waste management and cleaning of soil and subsoil water
- o (_20) Other service activities
- o (_21) Other, please state:

25. Which work tasks do you carry out in the workplace? (Check all that apply)

- ☐ (_1) Tasks specifically related to your PhD programme (such as food quality and safety, construction etc.)
- ☐ (_2) Administration (including accounting and secretariat functions)
- ☐ (_3) Data analysis
- ☐ (_4) Documentation
- ☐ (_5) Research
- ☐ (_6) Human resources
- ☐ (_7) Information
- ☐ (_8) Information technology tasks
- ☐ (_9) Chemical analysis
- ☐ (_10) Management or organization
- ☐ (_11) Middle or executive management
- ☐ (_12) Planning

- ☐ (_13) Production
- ☐ (_14) Product development or innovation
- ☐ (_15) Project management
- ☐ (_16) Consultancy
- ☐ (_17) Sales, marketing or advertising
- ☐ (_18) Service (including customer service)
- ☐ (_19) Teaching
- ☐ (_20) Other, please state:

[end if]

For the following questions, please assess, based on your PhD programme, various professional competencies based on two parameters: - whether you acquired the competencies during your PhD programme at DTU; and - whether the competencies have been relevant in your career so far. Some questions are related to competencies related to research and some are related to your personal competencies.

26. Do you think that you have acquired the following competencies during your PhD programme?

	To a high degree	To some degree	To a lesser degree	Not at all	Do not know
Ability to acquire knowledge at the highest international level within your research field	☐	☐	☐	☐	☐
Ability to contribute to developing new knowledge within your research field based on scientific studies	☐	☐	☐	☐	☐
Ability to master the scientific methods related to research and development tasks within your research field	☐	☐	☐	☐	☐

Ability to analyse and evaluate new ideas within your research field	□	□	□	□	□
Ability to design and develop new techniques within your research field	□	□	□	□	□

27. Do you think that the following competencies have been relevant in your career so far?

	To a high degree	To some degree	To a lesser degree	Not at all	Do not know
Ability to acquire knowledge at the highest international level within your research field	□	□	□	□	□
Ability to contribute to developing new knowledge within your research field based on scientific studies	□	□	□	□	□
Ability to master the scientific methods related to research and development tasks within your research field	□	□	□	□	□
Ability to analyse and evaluate new ideas within your research field	□	□	□	□	□
Ability to design and develop new techniques	□	□	□	□	□

within your research field					

28. Do you think that you have acquired the following competencies during your PhD programme?

	To a high degree	To some degree	To a lesser degree	Not at all	Do not know
Ability to participate in the international discussions in your field	□	□	□	□	□
Ability to disseminate scientific news and progress orally to a broad audience	□	□	□	□	□
Ability to disseminate research results in writing	□	□	□	□	□
Ability to organize research projects with limited scope and duration	□	□	□	□	□
Ability to manage research projects with limited scope and duration	□	□	□	□	□
Ability to initiate collaboration with companies and other research institutions to produce new knowledge	□	□	□	□	□
Ability to create growth and employment in Denmark's private sector through	□	□	□	□	□

research, development and innovation					

29. Do you think that the following competencies have been relevant in your career so far?

	To a high degree	To some degree	To a lesser degree	Not at all	Do not know
Ability to participate in the international discussions in your field	□	□	□	□	□
Ability to disseminate scientific news and progress orally to a broad audience	□	□	□	□	□
Ability to disseminate research results in writing	□	□	□	□	□
Ability to organize research projects with limited scope and duration	□	□	□	□	□
Ability to manage research projects with limited scope and duration	□	□	□	□	□
Ability to initiate collaboration with companies and other research institutions to produce new knowledge	□	□	□	□	□
Ability to create growth and employment in Denmark's private	□	□	□	□	□

sector through research, development and innovation					

30. Are there any types of knowledge or competencies you did not acquire during your PhD programme that should have been included?

- o (_1) Yes, please state which:
- o (_2) No

31. Are there any types of knowledge or competencies you acquired during your PhD programme that have been irrelevant in your career so far?

- o (_1) Yes, please state which:
- o (_2) No

32. Did you see a coach during your PhD programme?

- o (_1) Yes, at DTU
- o (_2) Yes, but outside DTU
- o (_3) No

33. During your PhD programme, did you develop any technologies, software or the like that have been patented?

- o (_1) Yes
- o (_2) No

34. Did you collaborate with industry on your PhD project?

- o (_1) Yes
- o (_2) No

35. During your PhD programme, did you take the initiative to improve your knowledge on innovation and entrepreneurship in general, or on how you could start your own company based on your research and your professional knowledge?

- o (_1) To a high degree
- o (_2) To some degree
- o (_3) To a lesser degree
- o (_4) Not at all
- o (_5) Do not know or do not remember

[Q29—CATEGORICAL—single—Must answer]
36. Did you study or carry out research at a university outside Denmark as part of your PhD programme?

- o (_1) Yes
- o (_2) No

[If Q36.ContainsAny({_1}) Then]

36.1 Did you think that your study or research visit outside Denmark contributed to your professional development?

- o (_1) To a high degree
- o (_2) To some degree
- o (_3) To a lesser degree
- o (_4) Not at all
- o (_5) Do not know

36.2 Did you think that your study or research visit outside Denmark contributed to your personal development?

- o (_1) To a high degree
- o (_2) To some degree
- o (_3) To a lesser degree
- o (_4) Not at all
- o (_5) Do not know

[end if]

37. To what degree do you agree or disagree with the following statements?

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Do not know
I have obtained experience in collaborating with people with a different cultural background than my own through my PhD programme at DTU	□	□	□	□	□	□

I have developed an international network through my PhD programme at DTU	□	□	□	□	□	□
I experienced DTU as an internationally oriented university in terms of the research environment	□	□	□	□	□	□

[if Q3.ContainsAny({_1}) OR Q3_2.ContainsAny({_2,_3,_4,_5}) OR Q3_3.ContainsAny({_2,_3,_4,_5}) OR Q3_4.ContainsAny({_2,_3,_4,_5}) then]

38. Rank the importance of the following 7 (international) competencies in carrying out your current job (or your latest job if you do not have a job at the moment). 1 is the most important and 7 the least important and we will ask you to only use each number from 1-7 once:

	1	2	3	4	5	6	7	Do not know
Verbal competencies in foreign languages	□	□	□	□	□	□	□	□
Written competencies in foreign languages	□	□	□	□	□	□	□	□
A global perspective—thinking not solely nationally	□	□	□	□	□	□	□	□
Knowledge about international research	□	□	□	□	□	□	□	□
Knowledge about	□	□	□	□	□	□	□	□

international engineering								
Understanding foreign cultures	□	□	□	□	□	□	□	□
Ability to collaborate with colleagues from other countries	□	□	□	□	□	□	□	□

[if Q38[CCategorical("_" + CText(i))].resp = Q38[CCategorical("_" + CText(i2))].resp and not Q38[CCategorical("_" + CText(i))].resp.ContainsAny({_8}) then]

39. Other than any parental leave, did you take any leave during your PhD programme?

- o (_1) Yes
- o (_2) No
- o (_3) Do not know or do not remember

[If Q39.ContainsAny({_1}) Then]

39.1 Which type of leave did you take? (Check all that apply)

- □ (_1) Leave paid by DTU that was relevant to my PhD programme
- □ (_2) Leave paid by DTU that was not relevant to my PhD programme
- □ (_3) Leave not paid by DTU that was relevant to my PhD programme
- □ (_4) Leave paid by DTU that was not relevant to my PhD programme
- □ (_5) Paid internship at a company
- □ (_6) Unpaid internship at a company
- □ (_7) Studying at another university
- □ (_8) Do not know or do not remember

39.2 Did you acquire competencies during your leave that have been relevant in your career so far?

- o (_1) Yes, please state which:
- o (_2) No
- o (_3) Do not know or do not remember

[end if]

[if Q3.ContainsAny({_1}) OR Q3_2.ContainsAny({_2,_3,_4,_5}) OR Q3_3.ContainsAny({_2,_3,_4,_5}) OR Q3_4.ContainsAny({_2,_3,_4,_5}) then]

40. Do you think that your PhD programme overall prepared you to carry out your current job (or your latest job if you do not have a job at the moment)?

- o (_1) To a high degree
- o (_2) To some degree
- o (_3) To a lesser degree
- o (_4) Not at all
- o (_5) Do not know

[end if]

41. When do you think that the competencies needed for job opportunities after graduation should begin to be clarified in the PhD programme? <style> .mrQuestionText {text-align: left;}</style>

- o (_1) In connection with the interview for the job as a PhD student
- o (_2) In connection with preparing the study plan (about 2 months after the PhD programme begins)
- o (_3) In connection with the first-year interview (1 year after the PhD programme begins)
- o (_4) One year before the deadline for submitting the thesis
- o (_5) Six months before the deadline for submitting the thesis
- o (_6) Continually
- o (_7) Never
- o (_8) Do not know

42. How did you seek career guidance for yourself during your PhD programme (Check all that apply)

- ☐ (_1) I sought career guidance from my PhD supervisor
- ☐ (_2) I sought career guidance from DTU's Career Centre
- ☐ (_3) I sought career guidance from a coach
- ☐ (_4) I sought career guidance from my personal network
- ☐ (_5) I sought career guidance from my professional network
- ☐ (_6) I did not seek career guidance
- ☐ (_7) Other, please state where:
- ☐ (_8) Do not know or do not remember

43. Is there something that DTU could do better with regards to the PhD programmes, career guidance, etc.?

- o (_1) Yes, please state:
- o (_2) No, I have no comment on what DTU could do better

The last questions are about your possible continuing education after having completed your PhD program.

44. Are you currently in or have you attended a continuing education programme after you graduated from your PhD programme?

- o (_1) Yes
- o (_2) No

[If Q44.ContainsAny({_1}) Then]

44.1 What continuing education programmes have you attended? (Check all that apply)

- ☐ (_1) One or more short courses, 0.5-1 days
- ☐ (_2) One or more courses, 2–3 days
- ☐ (_3) One or more courses, 4–5 days
- ☐ (_4) One or more courses, 6 days or more
- ☐ (_5) One or more e-learning courses
- ☐ (_6) A part-time MSc programme
- ☐ (_7) A part-time applied engineering programme
- ☐ (_8) Other, please state:

44.2 Which provider of continuing education have you used for your continuing education programmes or courses? (Check all that apply)

- ☐ (_1) DTU—Technical University of Denmark
- ☐ (_2) Another university in Denmark
- ☐ (_3) Another university outside Denmark
- ☐ (_4) A private provider
- ☐ (_5) An internal course in the company in which I am or was employed
- ☐ (_6) Other, please state:

44.3 In which field have you taken your continuing education courses? (Check all that apply)

- ☐ (_1) My research field
- ☐ (_2) Project management
- ☐ (_3) Management (HR)
- ☐ (_4) Quality assurance
- ☐ (_5) A new research field
- ☐ (_6) Other, please state:

[end if]

45. To what degree do you think that continuing education is important for you to maintain your value on the labour market?

- o (_1) To a high degree

- o (_2) To some degree
- o (_3) To a lesser degree
- o (_4) Not at all
- o (_5) Do not know

[if Q45.ContainsAny({_1,_2}) Then]

45.1 Why do you think that continuing education is important for you to maintain your value on the labour market? (Check all that apply)

- ☐ (_1) I obtain greater security in employment when I have updated knowledge in my professional field
- ☐ (_2) I can more easily seek new opportunities if I have the newest and thereby best qualifications
- ☐ (_3) I do not get surpassed by the new graduates, who have the latest theoretical knowledge
- ☐ (_4) My opportunities to link the experience I have from work to new knowledge give me greater professional flexibility
- ☐ (_5) I develop a new professional network on which I can draw in many different contexts
- ☐ (_6) It gives me better opportunities to be promoted to another position, such as a managerial position
- ☐ (_7) Other, please state:

[end if]

46. To what degree do you think that profession-specific continuing education is important for you to maintain your value on the labour market?

- o (_1) To a high degree
- o (_2) To some degree
- o (_3) To a lesser degree
- o (_4) Not at all
- o (_5) Do not know

[If Q46.ContainsAny({_1,_2}) Then]

46.1 Why do you think that profession-specific continuing education is important for you to maintain your value on the labour market? (Check all that apply)

- ☐ (_1) It will make me secure in my current job
- ☐ (_2) It may contribute to obtaining new or more interesting assignments
- ☐ (_3) It may contribute to obtaining a new job
- ☐ (_4) It may contribute to obtaining a new professional network
- ☐ (_5) Other, please state:

[end if]

[if Q45.ContainsAny({_1,_2,_3,_5}) OR Q46.ContainsAny({_1,_2,_3,_5}) then]

47. Which types of continuing education are you most interested in? (Check all that apply)

- ☐ (_1) Part-time programmes
- ☐ (_2) Full-time programmes
- ☐ (_3) Individual non-virtual courses
- ☐ (_4) Certification
- ☐ (_5) E-learning courses
- ☐ (_6) Other, please state:
- ☐ (_7) I am not interested in continuing education

[end if]

[If not q3.ContainsAny({_1}) AND not q10.ContainsAny({_3}) then]

48. Do you have any employment at DTU, such as being an external associate professor, part-time lecturer or the like?

- o (_1) Yes
- o (_2) No

[end if]

[if q3.ContainsAny({_1}) then]

49. In connection with this evaluation, we wish to conduct a number of qualitative interviews with companies/institutions to examine how they experience PhD graduates from DTU. Could it be that you would allow us to contact someone from your company/institution that has experience in management of newly qualified PhD graduates from DTU? The interview is not going to be about you or the answers that you have given, but about the competencies of DTU PhD graduates and graduates in general.

- o (_1) Yes, please enter contact information (name, email and/or telephone) of the person in your company/institution
- o (_2) No

[End If]

50. Do you want to receive a report with the results of this survey? Do you want to receive this at another email address than the one we used to contact you?

- o (_1) Yes, please send the report to the following email address:
- o (_2) Yes, please send the report to the email address you used to contact me

APPENDIX 2: INTERVIEW GUIDE

Tema og spørgsmål	Varighed	Sluttid

1. INTRODUKTION
Kursiveret tekst er information til interviewer og læses ikke op.
 	
• Forud for interviewet er følgende baggrundsoplysninger om aftageren indhentet:
  ○ Branche, primære aktiviteter, antal ansatte, internationalt/dansk etc.
  ○ Antal ph.d.'er ansat? (firma/afdeling)
  ○ Ansætter I primært ph.d.'er fra DTU eller fra andre universiteter?
  ○ Hvilke institutter på DTU ansætter I/du fra? (afdeling/firma)
  ○ Interviewpersonens stilling i firmaet og relation til DTU-dimittender? (nærmeste chef, HR, topchef …)
 	
Præsentation og rammesætning
 	
• *Præsentation af Epinion og interviewer*
• *Præsentation af undersøgelsen:*
 	
Vi vil gerne undersøge om ph.d.'er fra DTU opfylder virksomhedernes behov
 	
Vi vil anvende dine svar til at udvikle ph.d. uddannelsen på DTU
 	
• *Afgrænsning:* Vi beder dig om at tænke på ph.d.'er der har fået deres grad fra DTU indenfor de senest 4-5 år
• *Temaer:* I interviewet kommer vi igennem følgende 5 temaer:
  ○ Virksomhedens KOMPETENCEBEHOV
  ○ Match mellem kompetencebehov og PH.D.-DIMITTENDERnes kompetencer
  ○ Ph.d.-dimittendernes OVERGANG TIL ARBEJDSMARKEDET
  ○ Forskelle mellem PH.D.'er OG KANDIDATER
  ○ UDVIKLINGSTENDENSER i branchen
 	
De formelle og etiske rammer:
 	
• *Referat og lydoptagelse*
• *Anonymitet*
• *Ingen rigtige eller forkerte svar—vi vil gerne have alle nuancer og forskellige oplevelser med*
Præsentation
	5	5

• Vil du ikke starte med at præsentere dig selv? ○ *Navn* ○ *Virksomhed/arbejdsområder* ○ *Stilling* ○ *Anciennitet* ○ *Rolle/relation til ph.d.'erne i virksomheden*		
2. KOMPETENCEBEHOV OG PH.D.-DIMITTENDER *I dette afsnit afdækkes det generelle kompetencebehov blandt aftagervirksomhederne og hvordan ph.d.'erne matcher dette behov, samt hvordan DTU ph.d.'er klarer sig sammenlignet med ph.d.'er fra andre universiteter.* • Hvad lægger I i dag vægt på, når I ansætter ingeniørfaglige medarbejdere? • Hvilke faglige kompetencer efterspørger I? (bringe ny viden ind i virksomheden, evne til at tilegne sig viden på højeste internationale niveau, analysere og evaluere nye ideer, designe og udvikle nye teknikker, bidrage til udvikling af ny viden, mestrer videnskabelige metoder) ○ Hvorfor disse? Hvilke personlige/understøttende kompetencer efterspørger I? *(*evnen til at tage del i fagområdets internationale diskussioner, formidle videnskabelige nyheder og fremskridt, tilrettelægge og styre forskningsprojekter, initiere samarbejde med virksomheder og andre forskningsinstitutioner, skabe vækst og beskæftigelse) *)* ○ Hvorfor disse? • Har jeres kompetencebehov ændret sig over de seneste år? ○ Beskriv… • Hvordan vægter I de enkelte dele, når I rekrutterer? *(generelle ingeniørfaglige kompetencer, forskningskompetencer og personlige kompetencer)* *Efter at have kortlagt virksomhedernes behov og forventning vil vi spørge ind til deres konkrete erfaringer med ph.d.-dimittender generelt (dvs. ikke kun ph.d.'er fra DTU.* • Med udgangspunkt i de behov, du nu har fortalt om, hvordan mener I, at ph.d.'er matcher jeres forventninger og behov? ○ Hvordan vurderer I ph.d.' ernes ingeniørfaglige kompetencer? ○ Hvordan vurderer I ph.d.'ernes forskningskompetencer? ○ Hvordan vurderer I ph.d.'ernes personlige kompetencer? • Forventer I ph.d.'erne besidder andre kompetencer? ○ Hvilke andre kompetencer efterspørger I?	15	20

• Hvilken betydning har det for jer at ph.d.'erne har været på forskningsophold i udlandet?
  ○ Hvilke andre kompetencer har de opnået? Faglige? Personlige?
• Hvad betyder afhandlingens emne for ph.d.'ernes mulighed for at blive ansat hos jer?
  ○ Har I indgået i samarbejde med ph.d.-studerende ift. ph.d.-projekter/-afhandlinger? Hvorfor/hvorfor ikke?
 	
Vi vil nu spørge ind til virksomhedernes konkrete erfaringer med DTU ph.d.-dimittender.
 	
• Foretrækker i ph.d.'er fra bestemte universiteter?
  ○ Hvorfor/hvorfor ikke? *(probe:Bygger det på konkrete erfaringer?*
• Hvordan er DTU ph.d.'ernes kompetencer sammenlignet med ph.d.'er fra andre universiteter?
  ○ Hvordan udmærker DTU ph.d.'er sig? *(jf. ovenstående kompetencer)*
  ○ Er der områder, hvor DTU ph.d.'er kunne blive bedre ift. jeres kompetencebehov? Sammenlignet med ph.d.'er fra andre universiteter? *Uddyb…*		

3. OVERGANG TIL ARBEJDSMARKEDET
I dette tema afdækkes ph.d.'ernes overgang fra uddannelse til arbejdsmarked
 	
• Hvordan oplever I, at ph.d.'ernes overgang er fra uddannelse til arbejdsmarked?
  ○ Hvilke udfordringer oplever I typisk (hvis nogen)?
• I hvilken grad mener du, at ph.d.'erne skal have opnået følgende kompetencer gennem deres studie?
  ○ Projektlederkompetencer
  ○ Viden om økonomi, ledelse og organisering?
  ○ Andet?
	5	25

4. FORSKELLE MELLEM PH.D.'er OG KANDIDATER Efter at have spurgt ind til jeres konkrete erfaringer med ph.d.'er, vil vi spørge ind til, hvordan I oplever ph.d.'er sammenlignet med kandidater • Ansætter i primært ph.d.'er eller kandidater? (ansætter I overhovedet kandidater?) Hvorfor ansætter I således? • Hvordan oplever du forskellen på at ansætte en civilingeniør med tre års relevant erhvervserfaring og en ph.d.?	10	35

○ Varetager kandidater med tre års relevant erhvervserfaring og ph.d.'er de samme jobfunktioner hos jer? *(hvis de ikke har kandidater ansat, kan der spørges ind til, om det opleves, at de ville kunne varetage de samme jobfunktioner – altså opfattelse fremfor erfaringer)* ○ Hvis ikke: hvordan adskiller jobfunktionerne sig? Hvorfor? ○ Er der ph.d. specifikke kompetencer, som ph.d.'er besidder, og som kandidatuddannede med tre års relevant erhvervserfaring ikke besidder? ○ Hvilke? Relevante/irrelevante? ○ Mangler ph.d.'erne viden eller kompetencer, som kandidatuddannede med tre års relevant erhvervserfaring besidder? ○ Er der modsat kompetencer som kandidatuddannede med tre års relevant erhvervserfaring besidder, som ph.d.'er ikke besidder? Hvilke? ○ Hvilke? Relevante/irrelevante? ○ Mangler kandidatuddannede med tre års relevant erhvervserfaring viden eller kompetencer, som ph.d.'erne besidder? ○ Hvordan vurderer I overordnet set ph.d.'ernes kompetencer sammenlignet med civilingeniører med tre års relevant erhvervserfaring?		
5. UDVIKLINGSTENDENSER *I dette afsnit afdækkes de udviklingstendenser, som aftagerne identificerer* • Hvad er de mest fremtrædende udviklingstendenser i jeres/din branche? ○ Hvordan ser du jeres behov for ph.d.'er fremover? Beskriv… ○ Hvad oplever du har betydning for udviklingen? • Hvordan påvirker disse udviklingstendenser de kompetencer, I efterspørger fra jeres medarbejdere? (specifikt ift. ph.d.'er) ○ Ift. ex. viden, faglig ekspertise og uddannelse?	5	40
6. OPFØLGNING PÅ SPØRGESKEMA *I dette afsnit afdækkes eventuelle relevante fund fra spørgeskemaundersøgelsen.* • En tendens i spørgeskemaundersøgelsen blandt ph.d.'er er, at ph.d.'er som arbejder i de private/offentlige synes at være	5	45

overkvalificerede, mens de som arbejder på universiteter netop har de kompetencer de skal have. • Er ph.d.'erne overkvalificerede? Hvad byder de ind med som kandidaterne ikke gør?		
7. AFSLUTTENDE SPØRGSMÅL • Har du afsluttende kommentarer til undersøgelsen? Tak for din tid!	0	45

EPINION

EPINION AARHUS

HACK KAMPMANNS PLADS 1-3
DK-8000 AARHUS C
DENMARK
T: +45 87 30 95 00
E: TV@EPINION.DK
W: WWW.EPINION.DK

EPINION COPENHAGEN

RYESGADE 3F
2200 COPENHAGEN N
DENMARK
T: +45 87 30 95 00
E: TYA@EPINION.DK
W: WWW.EPINION.DK

EPINION HAMBURG

ERICUSSPITZE 4
20457 HAMBURG
GERMANY
T: +45 87 30 95 00
E: TV@EPINION.DK
W: WWW.EPINIONCONSULTING.DE

EPINION LONDON

AYLESBURY HOUSE, 17-18 AYLESBURY STREET
LONDON, EC1R ODB
UNITED KINGDOM
T: +45 87 30 95 00
E: TV@EPINION.DK
W: WWW.EPINION.DK

EPINION MALMÖ

ADELGATAN 5
21122 MALMÖ
SWEDEN
T: +45 87 30 95 00
E: TV@EPINION.DK
W: WWW.EPINION.SE

EPINION NUUK

POST BOX 4079
GL-3900 NUUK
GREENLAND
T: +299 54 89 33
E: KUF@EPINION.GL
W: WWW.EPINION.GL

EPINION OSLO

BISKOP GUNNERUS GATE 2
0155 OSLO
NORWAY
T: +47 97 11 73 50
E: CKL@EPINION.NO
W: WWW.EPINION.NO

EPINION SAIGON

11TH FL, DINH LE BUILDING,
1 DINH LE, DIST. 4, HCMC
VIETNAM
T: +84 8 38 26 89 89
E: OFFICE@EPINION.VN
W: WWW.EPINION.VN

EPINION STAVANGER

KLUBBGATEN 4
4006 STAVANGER
NORWAY
T: +47 90 17 18 99
E: SM@EPINION.NO
W: WWW.EPINION.NO

EPINION VIENNA

HAINBURGERSTRASSE 20/7
1030 VIENNA
AUSTRIA
T: +45 87 30 95 00
E: TV@EPINIONCONSULTING.AT
W: WWW.EPINIONCONSULTING.AT

WWW.EPINIONGLOBAL.COM