Rathenau Instituut

The impact of a doctorate

The careers and job prospects of doctorate holders in the Netherlands

Report

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Foreword

The Dutch knowledge ecosystem needs high-educated employees. It is one of the factors that matters most when businesses are considering moving their operations to the Netherlands. Every year, some five thousand graduate students in the Netherlands defend their dissertations successfully and are awarded a doctorate. They personally disseminate their academic expertise, something that they mainly do by publishing their research. But how many doctorate holders does society actually need? And to what extent does a doctorate have added value for the degree holder's later career?

The Rathenau Instituut studied the careers of doctorate holders and analysed questionnaires and supplementary data gathered by Statistic Netherlands. The number of doctorate holders in the Netherlands more than doubled between 1991 and 2016. The figures show that virtually all doctorate holders are in work, regardless of their chosen field of study. Moreover, the vast majority say that if they had to restart their careers, they would do a doctorate again. Most doctorate holders end up working in the fields in which they earned their degree, whether within or outside academia, and in both the public and private sectors. Many of them are still engaged in research or are responsible for supervising it. They say that they utilise their knowledge of the subject matter and their research skills in their careers.

We may conclude that doctoral programmes are useful both for individual careers and for society, even when doctorate holders work outside academia. This study contributes to the public debate about the importance of doctorate holders in the Dutch knowledge ecosystem. It can also further the discussion about structuring doctoral training in a way that facilitates a smooth transition to either an academic or non-academic career. Any increase in the number of doctoral places naturally begs the question of how universities will absorb larger numbers of doctoral candidates and assist them in writing their dissertations and preparing for their careers thereafter.

Melanie Peters
Director, Rathenau Instituut

Summary

Statistics Netherlands' *Careers of Doctorate Holders* dataset is unique. It collected the data at the request of the OECD as part of an international comparative study. Statistics Netherlands last collected data in 2014 by distributing a questionnaire to more than 16,000 doctorate holders who had received their degrees in the previous 22 years. It gave the Rathenau Instituut the opportunity to analyse these microdata.[1] Our analyses provided quite a bit of information on the importance of a doctorate degree in society. Our focus was on the Netherlands: the job market for doctorate holders, the importance of the expertise and skills that they acquire during their training, and how much value they themselves attribute to their degree.

Our conclusion is that having a doctorate matters both within academia but also beyond. Thirty percent of doctorate holders work for a university or university hospital; the other 70% are employed in public and private non-academic sectors. That means that a doctorate's significance goes well beyond that attributed to it in academia. The unemployment rate among doctorate holders is negligible. They also apply their expertise and research skills in non-academic jobs. Research is a major component of their work later on. Doctorate holders are therefore largely satisfied with their situation and would do a doctorate again if they had to restart their career.

This report discusses data on doctorate holders in six separate fields of study: the Natural Sciences, Engineering and Technology, the Agricultural Sciences, the Medical and Health Sciences, the Social Sciences and the Humanities. Each of these fields has its own attributes and differs from the others in size. Each has distinguishing features.

For example, doctorate holders in the Natural Sciences, Engineering and Technology, and the Agricultural Sciences are somewhat less likely to work for a university, with two thirds opting to work in the business enterprise sector. They also clearly earn more than their counterparts at universities and have much more job security.

[1] In this case, microdata are data that refer to individual persons. The Rathenau Instituut has been authorised by Statistics Netherlands to analyse these data for the purposes of scientific research.

In the Medical and Health Sciences, a doctorate is regarded as a necessary stepping stone to training as a medical specialist. Physicians, however, make far less use of their research competences than doctorate holders in other disciplines.

A quarter of doctorate holders in the Social Sciences, a broad field that includes economics and law, end up working in business services and for financial institutions, while the remaining three quarters work in education, public administration and healthcare. Forty percent continue their careers at a university. On average, they too earn a good income, although salaries in the non-academic world are considerably higher than in academia.

Doctorate holders in the Humanities are a small and exceptional group. Their incomes are the lowest of all the fields of study, almost a third below average and € 22,000 a year lower than incomes in the Social Sciences and Natural Sciences. A relatively large proportion work in education. Although a considerable majority are satisfied with their situation, their level of satisfaction is somewhat less pronounced than in the other fields of study.

Based on these findings, our conclusion is that researchers play a significant role not only in the academic world but also and in particular in the world beyond the university. We note that having a doctorate is beneficial not only for the doctorate holders themselves but also for society. Despite the rapid rise in the number of doctorates awarded, they have no trouble finding their way in the job market. These data do not offer any reason to limit the numbers of doctorates awarded. The notion is entirely groundless that a doctorate holder employed in a non-academic position ceases to engage in research. The overwhelming majority of those who seek employment in a public or private non-academic sector still have research as one of their core tasks.

Content

1 Introduction

1.1 Doctorate holders in Dutch society

Two concepts, 'impact of science' and 'talent development', underpin the Dutch Minister of Education, Culture and Science's science strategy. Science must have an impact, and it must be a breeding ground for talent. In this study, we link these two elements by looking at the position in society of the most obvious product of the Dutch science system: researchers themselves.

Impact of science

'Impact of science' is a broad concept that has many associations for stakeholders,[2] everything from cutting-edge research in the battle against cancer or Alzheimer's disease to university spin-offs, trust in science or innovativeness. There is no consensus when it comes to defining a set of indicators to measure the impact of science. One type of impact that is mentioned most often is economic impact: does investing in science yield benefits and can those benefits be expressed in monetary terms? Does science improve the Netherlands' GDP? Is it profitable for businesses? Does it lower costs for businesses, schools or hospitals?

These are interesting questions but difficult to answer, possibly because science is so closely entwined with our society and the effects of scientific findings are temporally and geographically diffuse. Science is, by definition, an international affair, so the efforts of Dutch research institutes may generate economic effects elsewhere, and vice versa. Time also plays a role. Many technologies that have a significant impact today (stem cell drugs, robotics, transport automation) can be traced back to research carried out decades ago – or longer.

Impact is also often regarded as a process. In formulating their research questions, do researchers consider how the knowledge that they hope to gain will be applied later on?

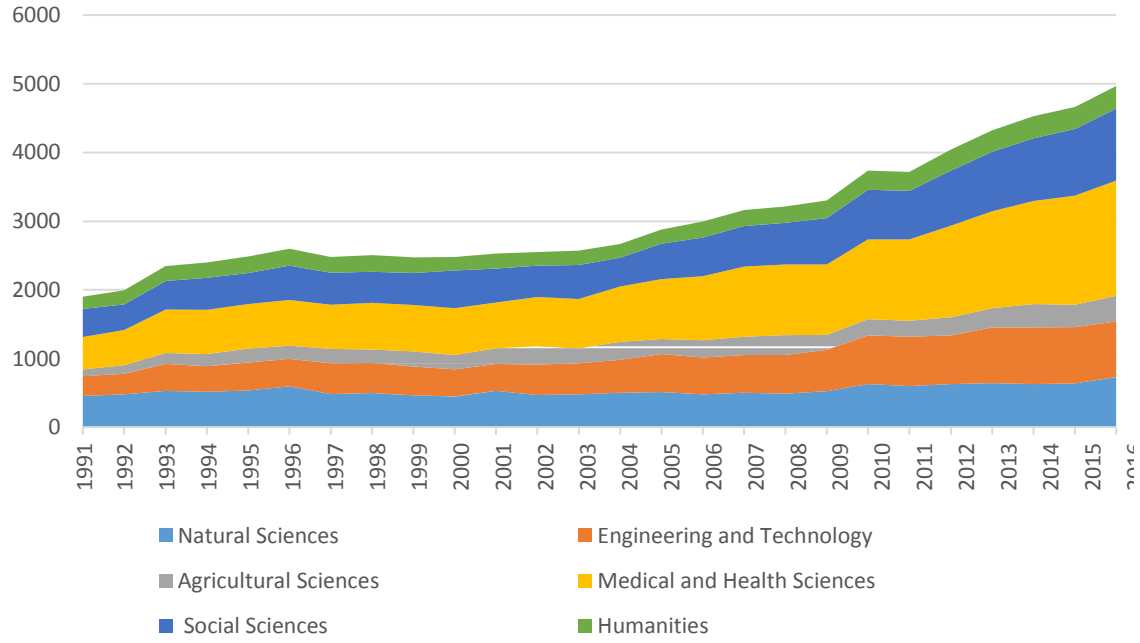
[2] There is fierce discussion about the impact of science on society and the impact factor of scientific publications. See also https://www.scienceguide.nl/2017/12/impact-en-impactfactor/ The Dutch State Secretary for Education, Culture and Science stated last year that a new award is being planned alongside the existing Spinoza Prize (the highest accolade for scientists in the Netherlands): the Stevin Prize, to be awarded to scientists who have had a major impact on society. https://www.nwo.nl/en/funding/our-funding-instruments/ttw/stevinpremie/stevinpremie.html

Do they involve stakeholders when drawing up their research agendas and conducting their studies, and do they keep track of how the media, businesses and non-profits are using their knowledge?

Impact by researchers

This publication takes a very different view. We consider the careers of doctorate holders as a product of the science system, and the attributes of disciplines as unique expressions of this impact.

Figure 1: Number of doctorate holders by year and field of study



Source: CBS StatLine (https://opendata.cbs.nl/statline/#/CBS/nl/dataset/71247ned/table?ts=1522313671675)

In 2016, almost 5000 doctorates were awarded in the Netherlands, two and a half times more than 25 years before. This increase applies across all disciplines, but it is steepest (both percentage-wise and in absolute terms) in the Medical and Health Sciences - and not just in the Netherlands but elsewhere too. As the Rathenau Instituut indicated in an earlier publication, the majority of doctorate holders (55%[3]) would prefer to pursue an academic career. Jobs in academia are limited, however. The previous study showed that of all those who received their doctorates in the Netherlands, 70% work *outside* academia, confirming the findings of earlier research.[4]

[3] See De Goede et al. (2014). *Promoveren in Nederland*. Den Haag: Rathenau Instituut
[4] De Goede e.a. (2013). *Academische carrieres en loopbaanbeleid*. Den Haag: Rathenau Instituut

Although the award of a doctorate is largely regarded as the first step in an academic career, the present study shows that it actually leads mainly to non-academic jobs. That is in fact one of the aims of the government policy meant to increase the number of doctorate holders. The policy document *2025 Vision for Science* describes '*the demand for more and broader talent in order to ensure the resilience of the national economy. This asks for a greater throughflow of PhD graduates into the private sector and central government positions*.'

In the public debate about the state of science, some have questioned whether it makes sense to encourage ever-greater numbers of doctorate holders, and whether this is what society actually wants (Science in Transition, 2014). An earlier study on academic careers revealed a lively 'trade' in researchers moving from universities to the non-academic job market and back again,[5] but until now we have been relatively in the dark about the position of doctorate holders in the non-academic job market.

The institutions that make up the science system are also encountering problems. That is because the flood of doctorate holders in the Netherlands and abroad has increased the supply of labour in the university job market, resulting in fiercer competition for fewer positions. Evidence can be found in the growing pressure on the European Union and on Dutch research funding bodies, for example the Netherlands Organisation for Scientific Research (NWO) and the health fundraising organisations, to fund research proposals. Despite the bigger budgets at their disposal, they are forced to reject many worthy proposals. The relaxed labour supply also means that universities can be more selective, of course. As for the academics themselves, they want research funding so that they can continue working at the university and advance their careers.[6] But the growing number of funding applications and the competition for scarce resources have driven NWO and the universities to implement a number of measures.[7]

Because both society and the individual doctorate holder have invested heavily in the latter's degree, it is important to establish whether there is any return on that investment. That return, it seems, takes the form of jobs both within and outside academia. In addition, it is important to know whether doctorate holders who work in a non-academic setting have jobs that are commensurate with their educational background and in which they can apply the skills that they acquired during their doctoral training.

CPB Netherlands Bureau for Economic Policy Analysis[8] has compared what doctorate holders earn to the incomes of Master's degree holders.

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5 De Goede e.a (2013). *Academische carrières en loopbaanbeleid*. Den Haag: Rathenau Instituut

6 https://www.rathenau.nl/nl/page/aanvraagdruk-bij-nwo

7 https://www.nwo.nl/en/news-and-events/news/2017/nwo-takes-measures-to-reduce-high-application-pressure.html

8 "Individual returns to a PhD education in the Netherlands: Income differences between masters and doctorate holders" CPB May 2014

The study showed that doctorate holders who have a university appointment start earning more than counterparts with only a Master's degree some twelve years after receiving their Master's. In other words, for the first twenty years of their career, having a doctorate does not translate into a higher salary; during that period, doctorate holders and Master's-only holders earn about the same. The added value of a doctorate is much clearer for those who work outside academia after receiving their Master's and who then obtain a doctorate. Those who pursue a career at the same university that conferred their doctorate must wait quite a long time before their degree translates into a higher salary, but eventually it does. The CPB's study does not investigate what researchers working outside academia do and whether they use their research skills in their jobs.

We broke down the question concerning the impact of doctorate holders on society into the following subsidiary questions:

1. What is the demand for doctorate holders in the job market, both within and outside the academic community at universities and university hospitals?
2. What role do the expertise and skills that doctorate holders acquire during their training play in their work later on?
3. How do doctorate holders perceive the relationship between their degree and their career path within and outside academia?

The answers to these questions serve as an indicator of the impact that doctorate holders have on society. Labour market success says something about the extent to which doctorate holders are in demand in the job market and the traits that they possess. The demand for doctorate holders says something about their value in the job market. If doctorate holders apply the expertise and skills acquired in their training later in their work, then it is likely that they have been hired precisely because of those skills. And if doctorate holders themselves value their degree, then that says something, indirectly, about the doctorate's added value.

1.2 Research on the careers of doctorate holders

To answer these questions, we zero in on the position of doctorate holders in society, what they do, and whether they actually use the competencies that they gained during their training. The international survey *Careers of Doctorate Holders*, which is carried out at regular intervals, is a critical source of information in that regard. Our analyses are based on the data collected in 2014 by Statistics Netherlands (CBS) for the *Careers of Doctorate Holders* project (CDH).

The CDH project is run jointly by the OECD, the UNESCO Institute for Statistics and Eurostat and involves a range of OECD member countries. Although the CDH survey has been repeated several times, changes in the methodology make it impossible to compare the most recent figures with previous years. For its own study, the Rathenau Instituut made use of Statistics Netherlands' database of more than 16,000 surveyed doctorate holders.

The target population of doctorate holders is heterogeneous. The position of a doctorate holder in Engineering and Technology may be very different to that of a doctorate holder in the Humanities. In addition to data on the entire group of doctorate holders, we have therefore split them into six broad fields of study: Natural Sciences, Engineering and Technology, Agricultural Sciences, Medical and Health Sciences, Social Sciences, and Humanities. Our conclusions regarding the doctorate holders in each of these fields inform our conclusions concerning the impact on society of doctorate holders in general. That is possible thanks to the vast number of doctorate holders who provided input by filling in the questionnaire, resulting in data on at least 500 respondents in each of these fields.

Description of the data

The Netherlands does not have a national register of doctorate holders. That makes it difficult to survey all doctorate holders in Dutch society. For the Dutch CDH survey, Statistics Netherlands asked Dutch universities to provide data on all individuals who had obtained their doctorate in the Netherlands between September 1990 and 31 August 2013. Statistics Netherlands looked up the individuals in this target population in the Municipal Personal Records Database (MPRD). Those identified then received an invitation in the post to participate in an online survey. Statistics Netherlands also requested records from the Dutch Tax and Customs Administration and a number of other official institutions. The dataset therefore consists of data drawn from records and the survey results.

Some doctorate holders were eliminated at various points in this procedure. We list the most important reasons below.

- There was a discrepancy between the number of doctorate holders about whom the universities provide data and the statistical data that they had furnished over time. The discrepancy was between 5 and 10%. That implies that universities were unable to provide personal data on some of the doctorate holders that they had reported.

- The university-sourced data did not include recent contact details for the persons concerned. Statistics Netherlands looked this up in the Municipal Personal Records Database (MPRD).

This resulted in the following findings:
- Some of those who obtained their PhD in the Netherlands no longer live in this country. It was not possible to request their data from abroad.
- About 70% of the doctorate holders could be traced in the MPRD. Of the remainder, the data provided by the universities could not be linked to data in the MPRD. This may be due to the presence of special characters in their name or because their name is spelled in different ways, but also because the data provided by the universities lack certain details, for example their initials or gender.
- Of the doctorate holders approached by Statistics Netherlands (16,463 persons), 51.5% responded.

Statistics Netherlands is prohibited by law from publishing raw sampling data. It extrapolates its data by using data weighting to estimate values for the entire population. For a detailed description of the data weighting process, see Maas et al. (2014). In this report, we only report numbers after data weighting.

Allocation to fields of study

The CDH study differentiates between six broad fields of study (clusters of disciplines). The classification into six fields is based on international agreements laid down in the Frascati Manual (where they are referred to as 'fields of science and technology'). In other publications, Statistics Netherlands uses a classification system that is similar but not precisely the same (based on the ISCED).[9] The definition of 'field of study' used in the CDH is also not entirely the same as the definition used in the Dutch Higher Education and Research Plan (HOOP) for teaching and research personnel, although there is considerable overlap. Two differences stand out. In the international classification system, the Social Sciences make up a single field; in the HOOP system, two of the disciplines in this field, economics and law, are listed separately. The second difference is the classification of veterinary science; in the Netherlands, the veterinary science programme is run by Utrecht University and is categorised under Medical and Health Sciences. In the international classification system, it is categorised under Agricultural Sciences.

Our study allocates data to the discipline as reported by the respondent and not according to the nature of the faculty or university where the respondent obtained his or her doctorate. That has implications mainly for engineers and doctorate holders in the Agriculture Sciences.

[9] http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-fields-of- education-and-training-2013-detailed-field-descriptions-2015-en.pdf

As a result, someone who has a doctorate in technical physics from one of the Dutch universities of technology, for example, may consider his or her degree a doctorate in the Natural Sciences and not in Engineering and Technology, or someone with a doctorate in economics from the Dutch agricultural university, Wageningen University and Research Centre, may consider himself an economist and not an agricultural scientist, which is how he would be classified in the HOOP statistics. Because of these differences, the relative sizes of the fields of study differ from the customary proportions in Dutch statistics. In the CDH target population, the Natural Sciences is a relatively large field, whereas Engineering and Technology and Agriculture Sciences are somewhat smaller. Ultimately, the survey responses were allocated across the six fields in the following manner.

Table 1: No. of doctorate holders in net sample by field of study

Field of study	Net sample size	Percentage	Percentage after weighing
Natural Sciences	4,656	28%	27%
Engineering and Technology	2,174	13%	11%
Agricultural Sciences	559	3%	4%
Medical and Health Sciences	4,674	28%	30%
Social Sciences	3,271	20%	21%
Humanities	1,129	7%	7%
Total	16,463	100%	100%

Statistics Netherlands: Microdata Careers of Doctorate Holders 2014

Rathenau Instituut

Below, we begin with a general overview and our overall conclusions. The six sections thereafter consider the doctorate holders in each of the six fields of study.

2 Careers of doctorate holders: General picture

The number of doctorates being conferred in the Netherlands and abroad is growing steadily. As the Rathenau Instituut indicated in an earlier publication, the majority of doctorate holders (55%) would prefer to pursue an academic career. However, university jobs are not growing at the same pace as the number of doctorate holders. Of all those who have received their doctorates in the Netherlands and still live there, 70% work in a non-academic setting. That is in fact one of the aims of the government policy meant to increase the number of doctorate holders. The policy document *2025 Vision for Science* (p. 68) describes '*the demand for more and broader talent in order to ensure the resilience of the national economy. This asks for a greater throughflow of PhD graduates into the private sector and central government positions*.'

In the public debate about the state of science, some have questioned whether it makes sense to have ever-greater numbers of doctorate holders, and whether this is what society actually wants. That is because the flood of doctorate holders in the Netherlands and abroad has increased the supply of labour in the university job market, resulting in fiercer competition for fewer positions. Evidence can be found in measures taken by the Netherlands Organisation for Scientific Research (NWO), the Dutch research funding body, to alleviate the pressure caused by the growing number of funding applications.[10] Because both society and the individual doctorate holder have invested heavily in the latter's degree, it is important to establish whether the non-academic job market is also making use of this group's specialist skills.

If doctorate holders engage in research as part of their job, or if they work in the field in which they obtained their PhD, then their degree is more likely to have contributed to their success in the job market. In this study, the question regarding the careers of doctorate holders and their impact on Dutch society has been broken down into the following three questions:

1. What is the demand for doctorate holders in the job market, both within and outside the academic community at universities and university hospitals?

[10] https://www.nwo.nl/en/news-and-events/news/2017/nwo-takes-measures-to-reduce-high-application-pressure.html

2. What role do the expertise and skills that doctorate holders acquire during their training play in their work later on?
3. How do doctorate holders perceive the relationship between their degree and their career path within and outside academia?

If it turns out that doctorate holders are considered desirable in the non-academic job market and that they actually use the skills acquired during their training, then it is likely that they are important to and have an impact on society. These findings may provide evidence for policy-making and input for the public debate concerning the growing number of doctorate holders in the Netherlands.

2.1 Demand within and outside academia

Dutch government policy on doctorate holders assumes that their specialist background is of added value to the Dutch academic and non-academic job market. Their training should prepare them to apply the skills and expertise that they have acquired in jobs both within and outside academia.

Below, we summarise the state of the job market for doctorate holders by considering their unemployment rate, their annual income, and whether their appointments are temporary or permanent. In 2013, total unemployment among doctorate holders was lower than the average unemployment rate among high-educated persons in the Netherlands (2% versus 4.2%). Doctorate holders also earn more. [11] Although doctorate holders in all six fields of study have a better job market position than the average high-educated person in the Netherlands, there are obvious differences between the fields. Table 2 compares doctorate holders on the job market indicators mentioned.

[11] In 2013, doctorate holders had an average personal income of € 90,000. High-educated individuals had an average income of € 59,900.

Table 2: Job market indicators of doctorate holders in various fields of study

Field of study	Unemploy-ment rate	Temporary contract	Annual income x € 1000		Difference annual income academic–non-academic x € 1000[12]	
			average	median	average	median
Natural Sciences	3.1%	21%	82	76	-11	-6
Engineering and Technology	2.4%	13%	89	81	-14	-6
Medical and Health Sciences	1.6%	25%	110	82	-6	4
Agricultural Sciences	1.2%	14%	85	81	-6	3
Social Sciences	2.0%	24%	82	74	-12	-5
Humanities	3.3%	25%	61	60	5	5
Total	2%	20%	90	77	-7	-2

Statistics Netherlands: Microdata Careers of Doctorate Holders 2014

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Table 3 shows that the unemployment rate among all doctorate holders is low (about half of that among high-educated individuals in the Netherlands), but that there are differences between fields of study. The unemployment rate in the Natural Sciences and the Humanities is more than double that in the Agricultural Sciences. Salaries also differ considerably. On average, doctorate holders who work in non-academic jobs earn € 7000 more a year. Doctorate holders in the Medical and Health Sciences clearly earn the most, and those in the Humanities the least. The differences between the other fields are narrower, with salaries in Engineering and Technology and the Agricultural Sciences being somewhat higher and those in the Natural Sciences and Social Sciences about the same.

On average, doctorate holders who work in non-academic settings earn more in all these fields – sometimes quite a bit more (+ € 14,000 in Engineering and Technology). Doctorate holders in the Humanities are the single exception; they earn more in academia.[13]

[12] A negative number implies that academic salaries are lower, a positive number implies that academic salaries are higher. All amounts are x € 1000 per year.

[13] The table also provides median figures. These are earnings precisely midway between highest and lowest. The median is lower because the distribution is skewed: there are a relatively large number of people with average salaries and a small number of people with substantially higher salaries. Those values influence the arithmetic mean (here: 'average'), but not the median. Taking the median also results in a different distribution of salaries within and outside academia. If we take the averages, we see that doctorate holders in the Medical and Health Sciences and Agricultural Sciences earn more working outside a university or university hospital; taking the median figures produces the opposite outcome.

The average values are naturally influenced by the higher incomes earned almost exclusively *outside* academia.

2.2 The role of the doctorate in the doctoral holder's work

The impact that doctorate holders have on society depends on the work that they do and the extent to which they apply the expertise and skills acquired during their training. The data are taken from three sources, ensuring that we can draw certain conclusions about the relationship between the work that doctorate holders do and their degrees:

- 70% of doctorate holders indicate that the work that they currently do is (closely/partly) related to their doctoral research.
- If doctorate holders engage in research as part of their job, we may assume that they are applying the research skills that they acquired during their doctoral training. Of those who work outside the university, 76% say that they engage in research. That is an ample majority. By way of comparison, that figure is 85% for academic staff at a university.

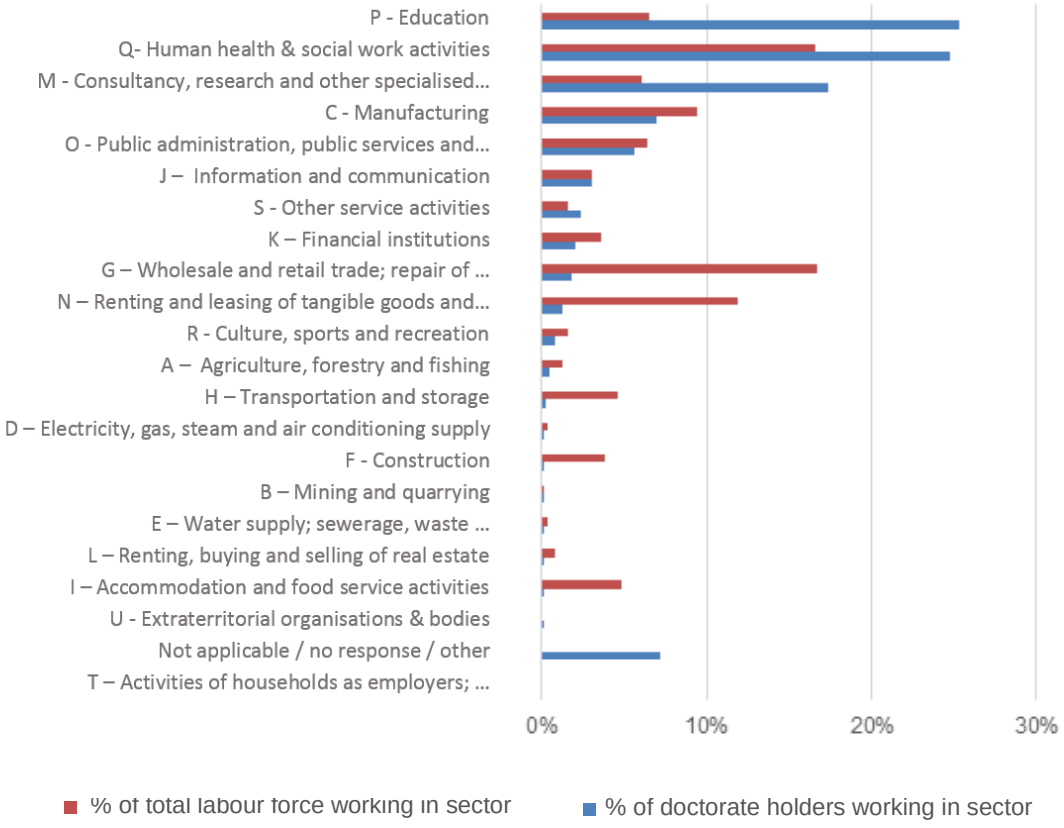
Table 3: Engagement in research by non-academics

	% non-acs in total	**% researchers among non-acs**	**% research time among non-acs**
Natural Sciences	79%	82%	62%
Engineering and Technology	83%	86%	64%
Medical and Health Sciences	64%	64%	43%
Agricultural Sciences	76%	84%	61%
Social Sciences	60%	80%	52%
Humanities	63%	64%	48%
Total	70%	76%	55%

Statistics Netherlands: Microdata Careers of Doctorate Holders 2014

We further know in which economic sectors doctorate holders end up working. As indicated earlier, 30% of doctorate holders find work at a university or university medical centre, making them the two biggest employers of our target population. Figure 2 shows the remaining 70% of doctorate holders who work outside academia. To compare, we have included figures on the Dutch labour force as a whole.

Figure 2: Percentage of doctorate holders working in sectors versus percentage of Dutch labour force employed in sectors



Statistics Netherlands: Microdata Careers of Doctorate Holders 2014

Where do doctorate holders work?

Doctorate holders tend to work in consultancy, research and other specialised business services (17%), human health and social work activities (25%), manufacturing (9%), education (25%) and public administration (6%).[14] Compared with the Dutch labour force as a whole, they are overrepresented in consultancy, research and other specialised business services, and – to a lesser extent – in human health and social work activities. Compared with the overall labour force, they are clearly underrepresented in the wholesale and retail trade, repair of motor vehicles and motorcycles, and renting and leasing of tangible goods and other business support services, sectors in which there are relatively few doctorate holders.

The second-largest group of employers after the universities and university hospitals are the general hospitals, with specialist medical practices as a close third. This has to do with the large number of doctorate holders in the Medical and Health Sciences sector. Other major employers are post-secondary, non-tertiary education, various types of R&D work, and technical design and consultancy.

Common occupations for doctorate holders are the following: professor and other instructor in higher education, medical specialist, biologist, botanist, zoologist, R&D manager, business manager and management consultant, researcher, engineer, teacher and specialist, policy consultant, software developer, systems analysist and IT consultant, chemist, psychologist, and teacher of general subjects in secondary education. The list shows us that research plays a relatively large role, but that there is also a relationship between a certain background and occupations associated with that background, e.g. in the case of medical specialists, chemists and psychologists.

2.3 How doctorate holders perceive their degree and their career

Of the doctorate holders surveyed, 84% say that their degree has had added value for their later careers. Among those who work in academia, that figure is 92%; for those who do not, it is somewhat lower at 81%. The reason that they give most often is that their doctorate has better prepared them for their work. In academia, 62% give this reason; outside academia, 57%. Another relatively common reason is that it improves their job prospects (56% vs 50%), but this is mentioned less often than the ‘better prepared’ argument in all fields except Medical and Health Sciences. In their responses to the open questions, the doctorate holders surveyed often state that their job required them to have a doctorate.

[14] It should be noted here that 5% of the doctorate holders working at universities neither teach nor engage in research. Of this group, 38% work as medical specialists and 12% as managers or administrators (in R&D or education, or unspecified). Regardless of their earlier responses, 8% say that their position falls into the category ‘Professor and other instructor in university education’. They may be deans and administrators at institutes who retain their academic status, even though their tasks are primarily administrative in nature. Finally, there is also a group consisting of academic advisers/supervisors or policy advisers (13% in all). The remainder have a range of different job titles: chemist, biologist, psychologist, archivist or IT specialist.

In addition, a doctorate is prestigious, especially abroad, and doctoral training provides academic skills/expertise in the chosen field.

Of the doctorate holders who do not engage in research, the biggest group (32%) say that the lack of a clear career path prevented them from seeking work in research, while the second-largest group (27%) cites the limited number of research places available. It is notable that in their responses to the open questions, doctorate holders also mentioned children/pregnancy as a reason not to pursue a career in research, alongside the many career-related factors.

There is a considerable gap between the percentage of doctorate holders who would prefer a career in academia (55%) and the percentage who actually work at a university (30%). Even so, 91% of all doctorate holders are satisfied (or very satisfied) with their current working environment, a figure that remains more or less the same in both the academic and non-academic setting. The level of satisfaction fluctuates somewhat between the different fields of study, but even in the discipline with the lowest score (Humanities), 87% are still satisfied with their job. The biggest differences between doctorate holders in academic jobs and those in non-academic ones concern the level of job security and the intellectual challenge of their position. Doctorate holders in academia are less satisfied with their job security than those working in other sectors (69% vs 81% are satisfied). The opposite is true when it comes to intellectual challenge (92% vs 83% are satisfied), but both figures are high.

Considering this high level of satisfaction, it is not surprising that 83% of the doctorate holders surveyed said that they would do their doctorate again if they had to restart their career. This percentage is higher among those working in academia than among those employed in the non-academic world (90% vs 81%).

Table 4: How doctorate holders perceive jobs and degrees

	Work is (partly) related to doctoral research	Doctorate has added value for career	Generally satisfied with current working environment		Would do doctorate again
			Academic	Non academic	
Natural Sciences	62%	86%	91%	92%	82%
Engineering and Technology	70%	82%	87%	92%	81%
Medical and Health Sciences	71%	89%	93%	93%	86%
Agricultural Sciences	76%	86%	92%	92%	82%
Social Sciences	76%	84%	90%	91%	82%
Humanities	69%	78%	89%	84%	85%
Total	70%	86%	91%	92%	83%

Statistics Netherlands: Microdata Careers of Doctorate Holders 2014

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2.4 Conclusion: What a doctorate degree means to society

Conclusion 1: Doctoral programmes also lead to jobs outside academia (70%).
We know from previous research that doctorate holders tend to focus on a career in academia during their study programme, and that they regard working outside the university as a 'second-best' choice. In many cases, they think of the academic world of universities and university hospitals as the only relevant place for research. In reality, however, a doctorate is a stepping stone to a career outside academia for many. Seventy percent of doctorate holders find a non-

academic job. They have a good position in the non-academic job market: they are rarely unemployed and they earn much more than their counterparts working at a university. Even outside academia, three quarters of doctorate holders still engage in research in their jobs. Doctoral training can therefore be regarded as one of the ways in which university research impacts society.

Conclusion 2: A doctorate is worth it, both for the individual doctorate holder and for society; there is no reason to restrict the number of doctorates awarded.
The growth in the number of doctorates awarded has added value for society (a well-educated population with skills that are in demand) and for the individuals concerned (good career prospects, a good salary and job satisfaction).
There is evidence for this in the fact that steady growth in the number of doctorate holders has not led to a glut in the Dutch job market. Doctorate holders have a good job market position and most of them use the skills that they acquired during their training. We see objective indicators for their added value not only at universities but also, and in particular, outside academia: they earn a good salary, they have a low unemployment rate, and they make use of their competencies. In general, then, the situation of doctorate holders in the non-academic job market is no reason to restrict growth in their numbers.
Doctorate holders working outside academia also earn more on average than their counterparts at universities, across almost all of the disciplines.

Conclusion 3: Even outside the universities, doctorate holders often engage in research and utilise the expertise that they have acquired.
Research is performed in both private and public institutions. It is not exclusive to universities or university hospitals; even outside academia there are jobs in which research is important. Doctorate holders are therefore able to make good use of the research skills that they have acquired. More than three quarters of doctorate holders who work outside academia perform research as part of their job. They are satisfied with their work and regard their doctorate as so valuable that a majority would do it again if they had to restart their careers.

2.5 Conclusions for specific fields of study

The added value of a doctorate in the Medical and Health Sciences lies mainly in the opportunity to enter a medical specialist programme.
The field of Medical and Health Sciences is a complex sector that has witnessed the largest increase in number of doctorate holders (see Figure 1). Doctorate holders in this field earn more than those in any other discipline and the rate of unemployment is extremely low. All this indicates that doctorates are highly significant in this field. But there are also counterarguments. Medical and Health Science students tend to want a doctorate primarily to qualify for a place as a medical specialist trainee (such places are extremely scarce and hotly contested).
Once they have their doctorate, they make only limited use of their research competences.
Even given these specific circumstances, however, a doctorate is certainly a significant factor in the Medical and Health Sciences.

Engineering and Technology and the Agricultural Sciences: mainly of significance in business consultancy, manufacturing and agriculture.
Doctorate holders in Engineering and Technology and in the Agricultural Sciences are in great demand in the job market. Their numbers are growing, but less rapidly than in the Medical and Health Sciences. There is very little unemployment. They have little trouble finding work. On average, they also earn more in the business enterprise sector than they do at a university and they make ample use of the research skills and expertise that they have acquired. Data from this study confirm that there is room in the job market for doctorate holders in these disciplines.

A doctorate in the Humanities is mainly of significance in the education sector. The number of doctorate holders in the Humanities is not growing as rapidly as in other fields. They are able to find work without too much difficulty. They work for a variety of different organisations, but with a strong concentration in the education and culture sectors. That is in part why they earn relatively little and why they tend to have more temporary and part-time jobs than other doctorate holders. Those who work outside academia make less use of their research skills than doctorate holders in other fields. There is therefore less demand for even more doctorate holders in this field.

Doctorate holders in the Natural Sciences and Social Sciences have many different career paths and job options.
Doctorate holders in both groups have a good position in the job market and earn comparable salaries.[15] Both make about the same use of their research skills and both are satisfied with the return on their investment in a doctorate. Their impact is thus similar in the respective sectors. Doctorate holders in the Social Sciences are twice as likely to work at a university than those in the Natural Sciences. There are also many more Social Sciences doctorate holders working in education. However, they can also be found in business services (e.g. in law firms) and the financial sector. Natural Scientists are more common in technical R&D, information and computer service activities and engineering firms. The emphasis in the Social Sciences is largely on education, government and healthcare; the emphasis in the Natural Sciences is on the private sector. The two groups are growing at differing rates. In the Natural Sciences, the number of doctorate holders has shown a modest rise (see Figure 1). The number of doctorate holders in the Social Sciences is growing twice as fast. The job market is able to absorb the output of doctorate holders equally well in both cases.

[15] At 3%, unemployment among doctorate holders in the Natural Sciences is somewhat higher than average, but still modest. In the Social Sciences, it is 2%.

3 Natural Sciences

Doctorate holders in the Natural Sciences are one of the larger groups in this study (28%). National figures show that the number of doctorates awarded in the Natural Sciences each year has risen by 60% over a 25-year period. That is the slowest rate of growth of all the different sectors. Their job market position is reasonably good.

3.1 Demand for doctorate holders in the Natural Sciences

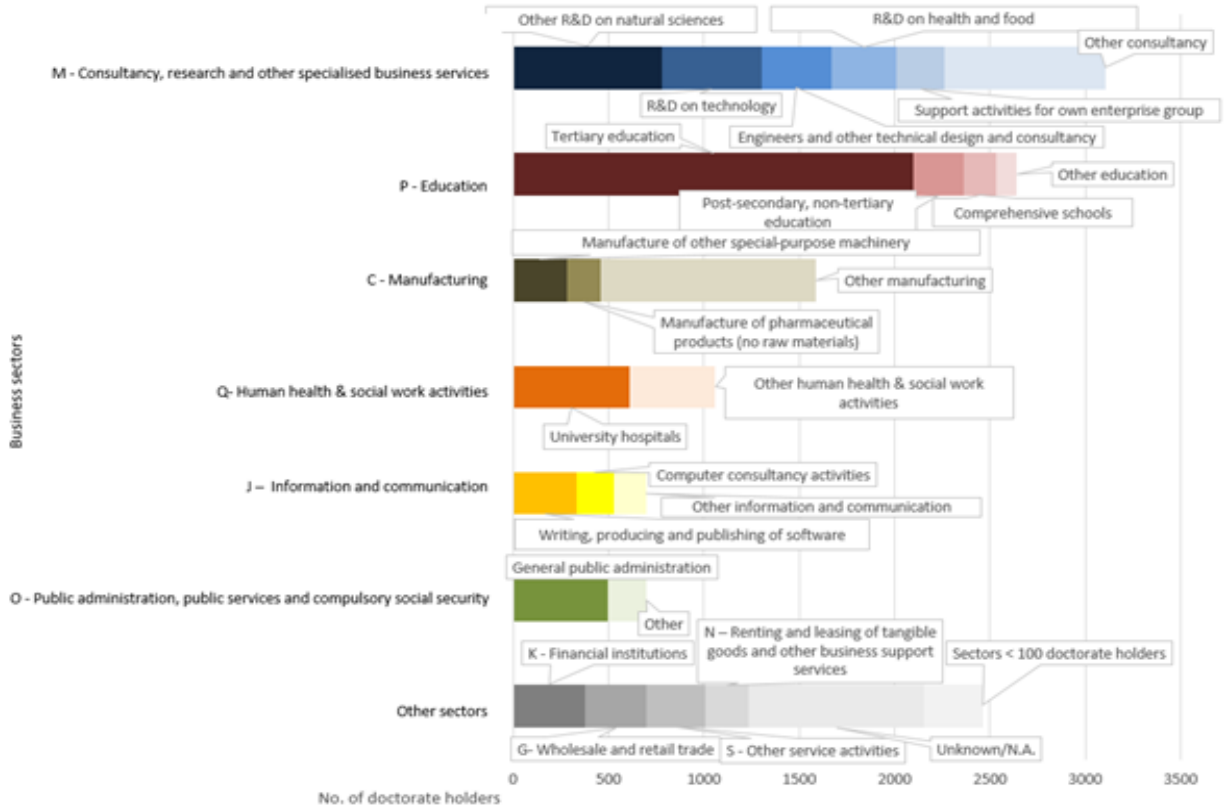
Doctorate holders in the Natural Sciences are often mentioned in the same breath as doctorate holders in Engineering and Technology but the two groups clearly have different job market attributes. Relatively few doctorate holders in the Natural Sciences have university jobs (21%); the vast majority work outside academia. The younger cohorts are more likely to work for a university, but this percentage drops over time. Doctorate holders in the Natural Sciences earn more outside academia than they do inside.

Job prospects for doctorate holders in the Natural Sciences are slightly less promising in virtually every area than those of doctorate holders on average. At 3%, their unemployment rate is above average and comparable to the jobless rate of doctorate holders in the Humanities. The unemployment rate among recent doctoral graduates is 6%. This is comparable to Engineering and Technology and higher than in most other fields. Doctorate holders in the Natural Sciences have the highest proportion of temporary contracts at universities across all fields (39%). Outside the university, they have about the same proportion of temporary contracts as other doctorate holders, on average (16%). At an average of € 82,000 a year, doctorate holders in the Natural Sciences earn less than their counterparts in most other disciplines, and those who work in academia earn considerably less than those in non-academic jobs (-€ 11,000). The percentage who work part time is well below average for all doctoral holders (3% in academia work part time, and 6% outside academia).

3.2 The role of the doctorate in the doctoral holder's work

Sixty-two percent of doctorate holders in the Natural Sciences indicate that their current job is related to their doctoral research, at least in part. At universities, this is 85%, and outside universities, 56%. These percentages are the lowest among all doctorate holders. Even so, 86% of doctorate holders in the Natural Sciences perform research as part of their work (98% of those employed in academia and 82% of those in a non-academic setting). They spend 63% of their working time engaged in research (68% for university staff and 62% for non-university). That means that they do more research than average. Those who work outside academia tend to have jobs in consultancy, research and other specialised business services, and manufacturing.

Figure 3: Business sectors employing doctorate holders in the Natural Sciences



Statistics Netherlands: Microdata Careers of Doctorate Holders 2014

If we examine the sectors in which these doctorate holders are employed, we see that in most sectors, there is an obvious relationship between their disciplinary background and the work that they do:

- R&D on the natural sciences, engineering, and health and food
- Engineers and other technical design and consultancy;
- University hospitals
- General public administration
- IT consultancy and development
- Manufacture of special-purpose machinery, devices and equipment.

Their main occupations are: biologist, physicist and astronomer, medical specialist, unspecified researcher / engineer / teacher / specialist, chemist / chemical engineer, systems analyst / IT consultant and software developer, mathematician, actuary and statistician, engineer, educational supervisor, secondary school teacher, R&D manager, and business consultant. The overlap with the Medical and Health Sciences is notable.

3.3 What doctorate holders think of their doctorate and career

The vast majority (86%) of doctorate holders in the Natural Sciences feel that their degree has had added value for their career. It makes little difference whether they are employed within or outside a university. More recent doctoral graduates are less convinced than those who received their doctorates longer ago. The reason given most often is that their degree has better prepared them to do their work.

The doctorate holders in non-research positions give two main reasons for not pursuing a research career: the uncertain future (mentioned most often by the younger cohorts) and the lack of research places. Other frequently cited reasons are: a different job, working conditions in research (e.g. the role of publications, relationship with peers, work pressure) and promotion to management positions.

Doctorate holders in the Natural Sciences are generally satisfied with their work, whether within or outside academia (91%). However, relatively few of those employed at a university are satisfied with their job security (62%).

Outside the university, a large percentage of doctorate holders in the Natural Sciences are satisfied with their working conditions (92%), but less satisfied with the intellectual challenge of their work (84%). If they had to restart their career, 82% of doctorate holders in the Natural Sciences would do a doctorate again. This is similar to the average for all doctorate holders.

3.4 Conclusion: Impact of doctorate holders in the Natural Sciences

Most doctorate holders in the Natural Sciences work for firms of consultants and research agencies, but they are also employed in manufacturing. Their annual salary is comparable to that in most of the other discipline clusters (lower than in the Medical and Health Sciences but higher than in the Humanities). Salaries outside the university are notably higher, showing that the job market values them. Their unemployment rate is somewhat higher than that of other doctorate holders, especially among recent graduates. The percentage who work on temporary contract for a university is also above average. But their doctorate degree has clearly been useful to them. They not only think that themselves but their opinion is confirmed by their performing a substantial amount of research, even if they work outside academia. They therefore believe that their doctorate has had considerable added value for their career. Generally speaking, doctorate holders in the Natural Sciences are very satisfied with their jobs.

4 Engineering and Technology

The group of doctorate holders in Engineering and Technology is medium-sized (13%) compared with the other fields. National figures show that the number of doctorates awarded in Engineering and Technology each year has risen by 183% over a 25-year period (almost triple). Their job market position is good and they are very satisfied with their jobs.

4.1 Demand for doctorate holders in Engineering and Technology

Only 17% of doctorate holders in Engineering and Technology work for a university. That is the smallest percentage for all the groups, less than half of the overall average. The difference between the cohorts is minimal. Doctorate holders in this field leave the university fairly soon after receiving their degrees. They earn more outside academia than they do at universities (€ 92,000 vs € 78,000 on average).

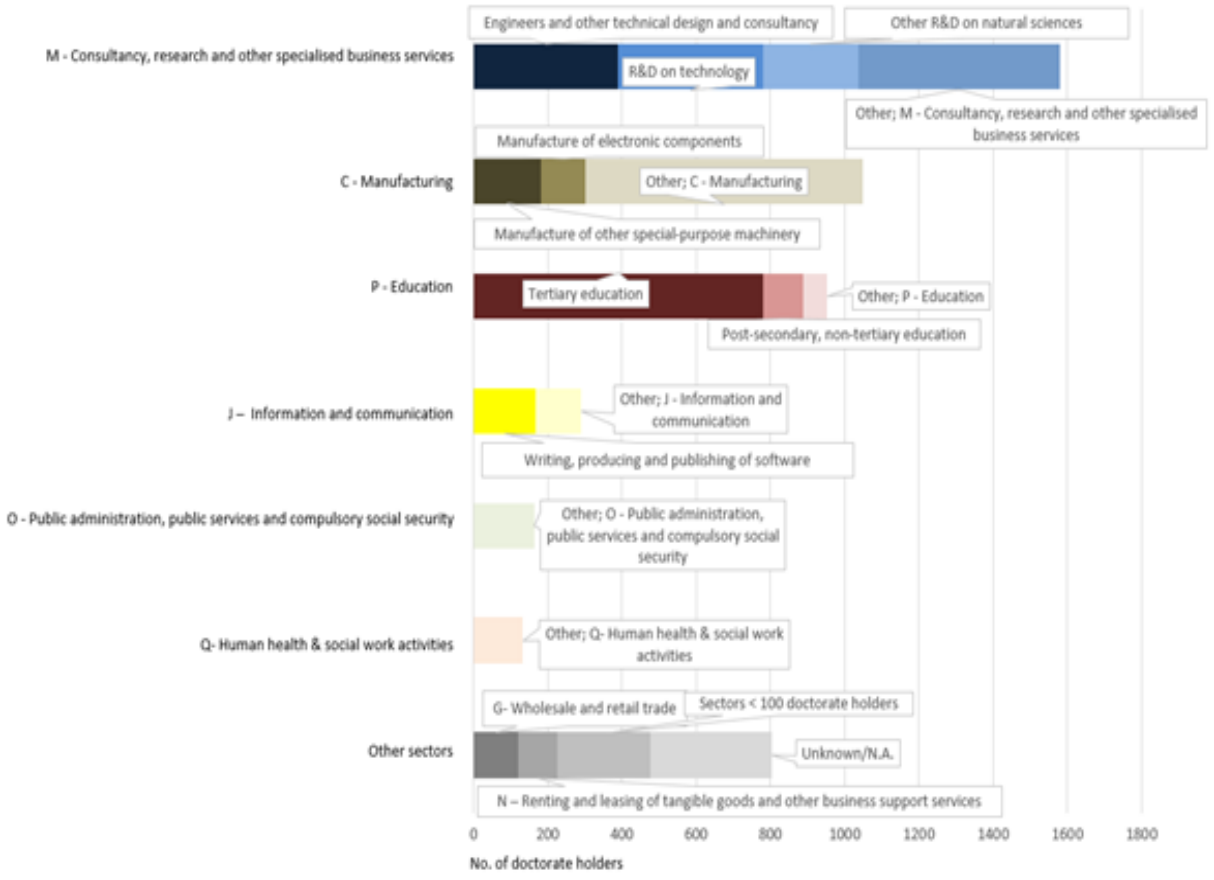
The majority of doctorate holders in Engineering and Technology therefore find jobs outside academia. Compared with their counterparts in other fields, their position in the non-academic job market is very good: their unemployment rate is low (2%), their salaries are high (an average of € 89,000) and very few are forced to make do with a temporary appointment (10%). Compared with other fields, the unemployment rate among recent doctoral graduates is relatively high (6%), mainly owing to the relatively high unemployment rate among those who obtained their previous degrees outside the Netherlands. Of this group, who account for more than a fifth of all recent doctoral graduates in Engineering and Technology, 11% are unemployed. By comparison, the unemployment rate among those who gained their previous degree in the Netherlands is only 4%. The gap is striking because it compares unfavourably with the Natural Sciences, for example, and because the Engineering and Technology sector is often said to have a shortage of high-educated personnel.

4.2 The role of the doctorate in the doctoral holder’s work

Seventy percent of doctorate holders in Engineering and Technology who work outside academia say that the work that they currently do is partly or closely related to their doctoral research. That is slightly above average. By way of comparison, 89% of doctorate holders who work for a university say that their current work is related to their doctoral research.

Doctorate holders in Engineering and Technology who work outside a university are more likely than any other group to engage in research (88%). They also spend a larger percentage of their working time on research (an average of 64% of their time).

Figure 4: Business sectors employing doctorate holders in Engineering and Technology



Source: Statistics Netherlands - Microdata Careers of Doctorate Holders

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There is a clear relationship between their background in Engineering and Technology and the sectors in which they are employed. The biggest sectors by far are: consultancy, research and other specialised business services (38%) and manufacturing (25%). In addition to academia, other relatively large employing sectors are information and communication (7%) and education (5%). In the sector made up of consultancy, research and other specialised business services, most employers fall into the R&D category, more specifically focusing on technology and ‘other natural sciences’.

In manufacturing, most of these doctorate holders work in the manufacture of special-purpose machinery, devices and equipment and in the manufacture of electronic components.

The occupations of doctorate holders in Engineering and Technology are also related to their background. Most of those working outside the university are R&D managers. Other common occupations are clearly related to their engineering/technological background, either with regard to subject matter or methodology: mechanical engineer, software developer, systems analyst and IT consultant, and unspecified chemical engineer and researcher, engineer, teacher and specialist. Finally, another common occupation is business manager and management consultant. The relationship between these latter occupations and the doctorate holder's training is less obvious.

4.3 What doctorate holders think of their doctorate and career

An average of 82% of doctorate holders in Engineering and Technology feel that their doctorate degree has had added value for their career. That is somewhat below average for all doctorate holders, although it is still a substantial majority. In particular, the percentage of those working at a university who see added value in their degree is below average. The most important reason given for the added value is that they feel their doctorate has better prepared them for their work. Those working at a university often cite another reason: having a doctorate improves their opportunities for advancement. Doctorate holders who work outside academia say that their degree improves their job opportunities. They also say that doctorates are held in high regard in the Netherlands and abroad.

Doctorate holders in Engineering and Technology who work in non-research positions are most likely to cite 'no clear career path in research' and 'lack of research places' as reasons for not pursuing a career in research. A relatively large number also say that they have been promoted to management positions.
A large majority of doctorate holders in Engineering and Technology are satisfied with their working environment. Those working outside academia are somewhat more satisfied (92%) than those who work at a university (87%). The level of job satisfaction in academia is comparable to that of other doctorate holders (91% on average). Those who work at a university are less satisfied with their salary, although an ample majority still say they are satisfied (80%). It is notable that satisfaction regarding the social relevance of their work is relatively low among doctorate holders employed outside the university (89%). All in all, the percentage of doctorate holders in Engineering and Technology who would do a doctorate again if they had to restart their career is on the higher end of average (89% of those working at a university, 80% of those working outside academia).

4.4 Conclusion: Impact of doctorate holders in Engineering and Technology

Doctorate holders in Engineering and Technology do have an impact on society. They work mainly in the private sector: consultancy, research and other specialised business services, and manufacturing. There is considerable demand in society for doctorate holders in Engineering and Technology. Their unemployment rate is low, salaries in the non-academic job market are higher than those in academia, and only a small share are employed at universities. Society clearly has a demand for their technical expertise, but also for their doctorate; specifically, their jobs tend to involve a considerable amount of research and they actually spend much of their working time engaged in research.

One group stands out: recent doctoral graduates from abroad have more trouble finding a job.

5 Agricultural Sciences

Doctorate holders in the Agricultural Sciences are one of the smallest groups in this study (3%). National figures show that the number of doctorates awarded in the Agricultural Sciences each year has risen by 273% over a 25-year period (almost quadruple). These doctorate holders have an excellent job market position.

5.1 Demand for doctorate holders in the Agricultural Sciences

At 24%, the share of doctorate holders in the Agricultural Sciences who work for a university is below average. The percentage is higher among recent doctoral graduates (33%) but diminishes over time. The unemployment rate among doctorate holders in the Agricultural Sciences is low (1%), even among recent graduates.

On average, doctorate holders in the Agricultural Sciences earn a somewhat smaller salary than other groups of doctorate holders (€ 85,000). They tend to earn more working outside the university than within (€ 86,000 vs € 80,000).[16]

The number of temporary contracts is well below average for doctorate holders (14%). The percentage of Agricultural Scientists who work part time is slightly above average (9% vs an average of 8%), but much lower than among high-educated individuals in the Netherlands. The percentage who work part time outside the university is double the percentage who work part time in academia. The percentage of doctorate holders in the Agricultural Sciences who obtained their previous degree abroad is the smallest of all the groups (3%).

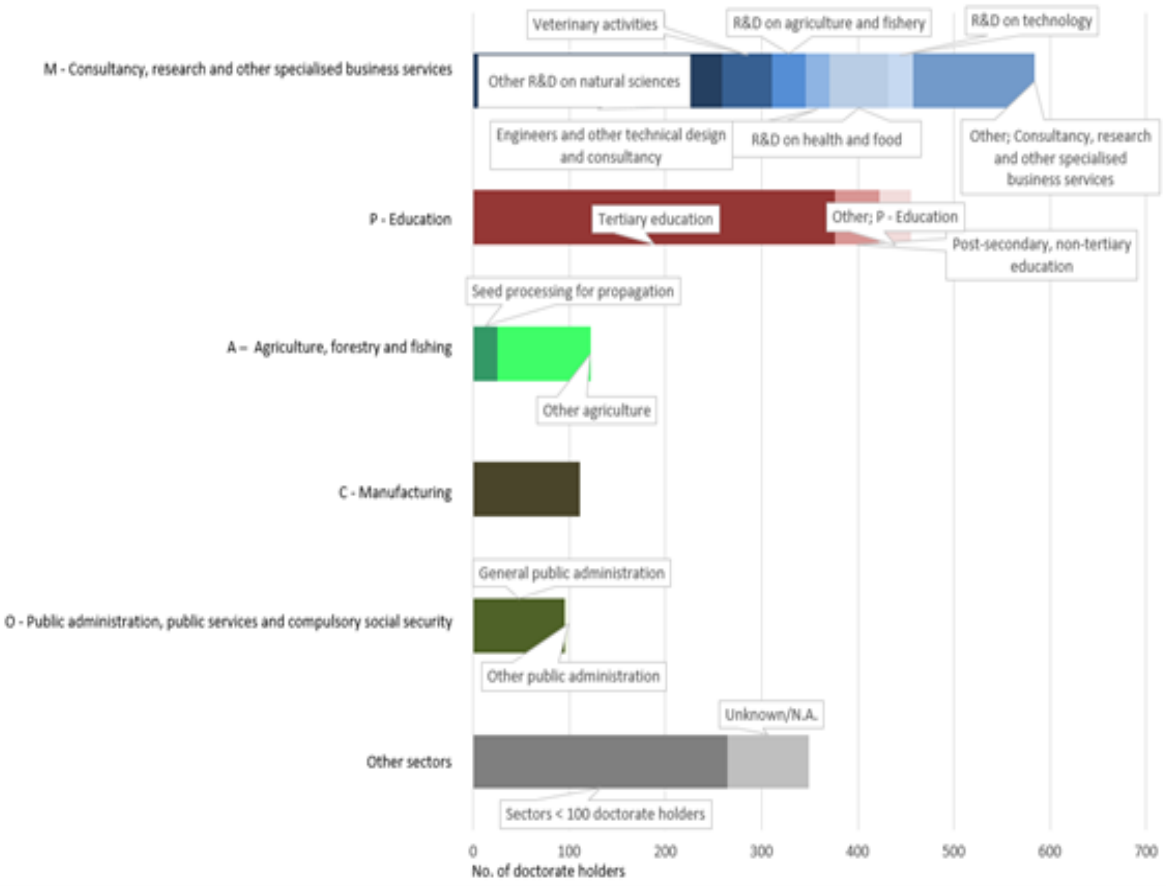
5.2 The role of the doctorate in the doctoral holder's work

A relatively large percentage of doctorate holders in the Agricultural Sciences (76%) indicate that there is a relationship between their doctoral research and their work.

[16] That does not apply to the median. The salary distribution among doctorate holders in the Agricultural Sciences who work in non-academic settings is skewed; the biggest group earns salaries similar to those earned at universities, but there is a small group that earns very high salaries and this pushes the average up considerably. Most of these high earners work outside academia.

This is also because doctorate holders working outside the university say there is a relationship between their work and their doctoral research (74% vs 62% on average).
The percentage of Agricultural Science doctorate holders who engage in research in jobs outside academia is one of the highest among all doctorate holders (87%). The amount of time that they spend on research in their jobs is also above average (60% of their time). Outside the university, the sector that employs the most doctorate holders in the Agricultural Sciences is consultancy, research and other specialised business services (44%). This is followed by agriculture, forestry and fishing (9%). Other relatively significant sectors are manufacturing, public administration and education.

Figure 5: Business sectors employing doctorate holders in the Agricultural Sciences



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Doctorate holders employed in the largest sector, ‘consultancy, research and other specialised business services’, often engage in R&D. This specifically entails R&D on health and nutrition, other natural sciences, and agriculture and fishery.
Their occupations tend to be related to their background: biologist / botanist / zoologist, R&D manager, agriculture, forestry and fishery consultant, veterinarian, medical specialist, dietician and nutritionist. They also often work as business managers and management consultants, policy advisers, unspecified researchers / engineers / teachers / specialists, and senior executives and managing directors of large companies.

5.3 What doctorate holders think of their doctorate and career

A large percentage of doctorate holders in the Agricultural Sciences say that their doctorate degree has had added value for their career (86%). That is also true for those who work outside academia (84%). The most common reason given is that their degree has ‘better prepared them to do their work’.
More opportunity for promotion and better job prospects also play a role, especially for doctorate holders who work at a university. Those who work outside the university often emphasise the importance of better job prospects. In their responses to the open questions, they focus on prestige, respect and being taken seriously by clients and foreign contacts.

Of the doctorate holders in non-research positions, the largest percentage say that the lack of clear career opportunities and an uncertain future dissuaded them from pursuing a career in research. Many also state that their current job simply does not involve research.

Doctorate holders in the Agricultural Sciences are often generally satisfied with their working environment (92%). There is no difference in that regard between those who work within and those who work outside a university. There are differences between the two groups when it comes to more specific aspects of their working environment. Those who work for a university are less satisfied than other doctorate holders with their salary, their career growth opportunities, and the prestige of their job. If forced to restart their career, most by far would do a doctorate again (82%).

5.4 Conclusion: Impact of doctorate holders in the Agricultural Sciences

The attributes of doctorate holders in the Agricultural Science closely resembles that of doctorate holders in Engineering and Technology. They tend to work in the private sector, where they generally earn more than in academia. Unemployment is virtually non-existent. The percentage of temporary contracts is also very small, especially outside universities.

Their work is often related to their doctoral research and many who work outside academia engage in research as part of their job. Thanks to their research experience and expertise, they are also equipped to take on jobs outside universities. This means that their doctorate degree is likely to have a considerable impact.
As a result, doctorate holders in the Agricultural Sciences are very satisfied with their jobs, whether or not they work in academia. It is notable, however, that those who work at a university are less satisfied with their salary, career growth opportunities and prestige than those who work outside academia.

6 Medical and Health Sciences

Almost a third (28%) of doctorate holders hold degrees in the Medical and Health Sciences, a figure that has increased to more than a third in recent years. National figures show that the number of doctorates awarded in the Medical and Health Sciences each year has risen by 256% over a 25-year period, to almost 1700 individual degrees in 2016. This is, however, a group that differs from other doctorate holders in the Netherlands in more than one respect.

6.1 Demand for doctorate holders in the Medical and Health Sciences

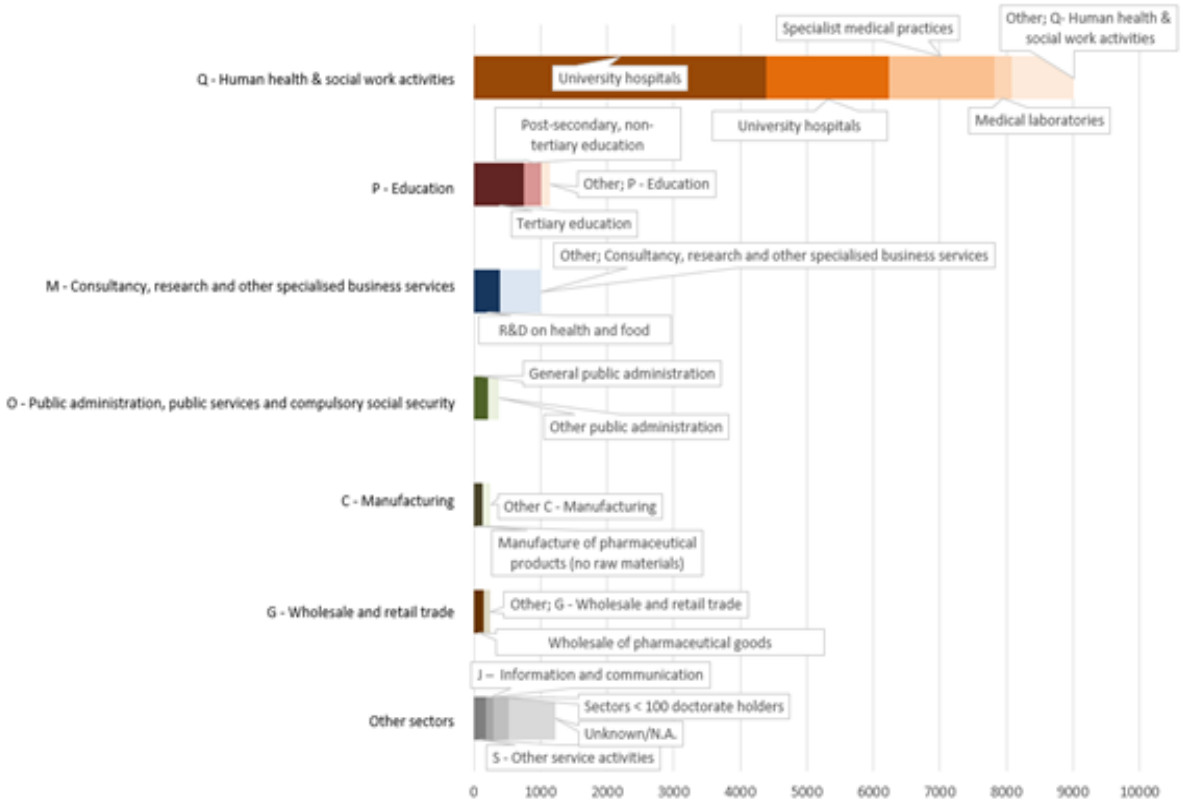
Of all doctorate holders in the Medical and Health Sciences, 36% work as researchers and/or instructors at a university or university hospital. That is above average for doctorate holders in general (30%). The longer ago they received their doctorate, the smaller the percentage still working at a university/university hospital, but regardless of the cohort, the percentage employed in academia remains above average. Doctorate holders who work for a university/university hospital in most cases earn more than those employed outside academia.

They have a good job market position: only 1.6% are unemployed, and their salaries are among the highest of all doctorate holders (an average of € 110,000 a year, with a median of € 82,000). Their excellent income position is constant across all cohorts when compared with doctorate holders in other fields. The percentage of temporary contracts is high compared with other doctorate holders (25%), especially among those who work outside university hospitals (22% vs 16% on average). In fact, the percentage of temporary staff in the Medical and Health Sciences is high compared with all high-educated individuals in Dutch society. Doctorate holders in the Medical and Health Sciences are also more likely to be self-employed, especially those who work outside academia. The majority of those in self-employment are medical specialists who have their own practice (65%). At the university, only a small percentage of doctorate holders work part time (5%); that percentage is higher outside academia (9%), but remains low when compared with high-educated individuals in the Netherlands (23%). Approximately 4% of doctorate holders in this field obtained their most recent previous degree outside the Netherlands.

6.2 The role of the doctorate in the doctorate holder's work

According to their own reports, 71% of doctorate holders in the Medical and Health Sciences indicate that their current work is closely or partly related to their doctoral research. Compared with other groups, the percentage who see a relationship between their doctoral research and their work is slightly below average (82% versus an average of 85%). There are fewer doctorate holders in the Medical and Health Sciences engaged in research than in other groups of doctorate holders. Outside the university/university hospital, 64% of doctorate holders engage in research. Of all doctorate holders, this group spends less time engaged in research (an average of 47% of their time, 53% in academia and 43% outside academia).

Figure 6: Business sectors employing doctorate holders in the Medical and Health Sciences



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Nevertheless, there is a relationship between the field in which the doctorate holders obtain their degrees and the work that they do. Fifty-nine percent are employed in human health and social work activities, specifically at university hospitals (33%) and other hospitals (12%) or in a medical specialist practice (10%). Even those employed in other sectors, for example consultancy and R&D activities (8%), public administration (3%) and manufacturing (2%), mainly work for organisations that focus on medical care. Of all doctorate holders in the Medical and Health Sciences, 44% work as medical specialists, 8% as professors or instructors of another kind in higher education, 4% are physicians (including GPs) and 4% are biologists. Doctorate holders further work in a variety of different occupations.

6.3 What doctorate holders think of their doctorate and career

Doctorate holders in the Medical and Health Sciences are very positive about the impact that their doctorate has had on their career. Almost 90% believe that their degree has had added value for their career. Broken down, that is 94% of those employed at a university and 87% of those who are not.
This means that of all doctorate holders, those in the Medical and Health Sciences are most likely to think that their degree has had added value for their career. The reason mentioned most often is that their degree translates into better job opportunities. This sets the field of Medical and Health Sciences apart: the reason cited most often by doctorate holders in all other fields is that their degree has better prepared them to do their work. The responses to the open questions reveal the source of this difference. A doctorate is often regarded as a prerequisite for admission to a medical specialist training programme. This was the main motive for obtaining a doctorate for many doctorate holders in this field. The same applies for becoming a teacher of medical specialists. In the eyes of many physicians, then, a doctorate is a stepping stone to medical specialist training.

We see this again in the responses of those working in non-research positions when asked why they have not pursued a career in research. Their answers reveal that many doctorate holders used their doctorate to become specialists, and not to do research. They have no time left to engage in research alongside their clinical tasks during the training programme itself, and that is often also the case thereafter. Of all doctorate holders in the Medical and Health Sciences, 93% are satisfied (or very satisfied) with their current working environment. This is the highest percentage in all fields. Generally speaking, there is no difference in that respect between those who work within and those who work outside academia. They do differ somewhat on three aspects, however: a slightly larger number of doctorate holders in academia are more satisfied than their non-academic counterparts with the intellectual challenge of their work and with their career growth opportunities; with regard to job security, however, the roles are reversed.

A considerable majority of doctorate holders (86%) would do a doctorate again if they had to restart their career. That is the case for 92% of those who work at a university and 83% of those who do not.

6.4 Conclusion: Impact of doctorate holders in the Medical and Health Sciences

The Medical and Health Sciences differ from the other fields of study in many respects. Most doctorate holders see their degree as a stepping stone to medical specialist training. Its main function was to secure them one of the few training places. They also regard a doctorate as a prerequisite for other non-research positions in the medical sector. This corresponds with the very steep rise in the number of doctorates awarded; among physicians, the position of medical specialist is the most desirable of all. This set of circumstances has led to an unusual situation. Whereas doctorate holders in the other disciplines are very likely to make use of the research skills that they have acquired, that is much less true of this group. The relationship between their work and their doctorate is also relatively weak.

On the other hand, they earn very good salaries and their job market position is excellent, with unemployment being almost non-existent. Non-academic salaries on average are still higher than at a university/university hospital.[17] According to many of the doctorate holders, having a doctorate is also prestigious and offers them better career opportunities (e.g. as a teacher of medical specialists). All this explains the exceptionally high added value of doctorate in the job market for doctorate holders in the Medical and Health Sciences. It should be noted, however, that this impact is due more to a set of unwritten rules concerning medical specialist training than to specific preparation for a job in which research is an important component.

[17] That does not apply to the median. The salary distribution among physicians who do not work in academia is skewed; while the biggest group earns salaries similar to salaries at universities/university hospitals, there is a small group that earns very high salaries and this pushes the average up considerably. Most of these high earners do not work for a university/university hospital.

7 Social Sciences

Doctorate holders in the Social Sciences account for a fifth of all doctorate holders (20%). National figures show that the number of doctorates awarded in the Social Sciences each year has risen by 155% over a 25-year period. These doctorate holders have a fairly good job market position. They are often mentioned in the same breath as doctorate holders in the Humanities, but there are distinct differences between the two groups. As indicated earlier, in our study this field encompasses not only the social sciences as defined in the Dutch Higher Education and Research Plan (HOOP), but also law and economics.

7.1 Demand for doctorate holders in the Social Sciences

Doctorate holders in the Social Sciences are more likely to work for a university than their counterparts in other fields (40%). Indeed, almost half of all recent doctoral graduates do (48%), although this percentage is relatively high in the other cohorts too.
Doctorate holders in the Social Sciences have a good position in the job market, even when compared with other doctorate holders. Their unemployment rate is relatively low (2%). Recent doctoral graduates have a slightly higher unemployment rate (3%), but that is still much lower than recent doctoral graduates in the Natural Sciences, Engineering and Technology, and the Humanities (6%). However, the percentage of Social Sciences doctorate holders working on temporary contracts in academia is above average (35%). Outside academia, they are somewhat less likely to have a temporary contract than other doctorate holders (15%).

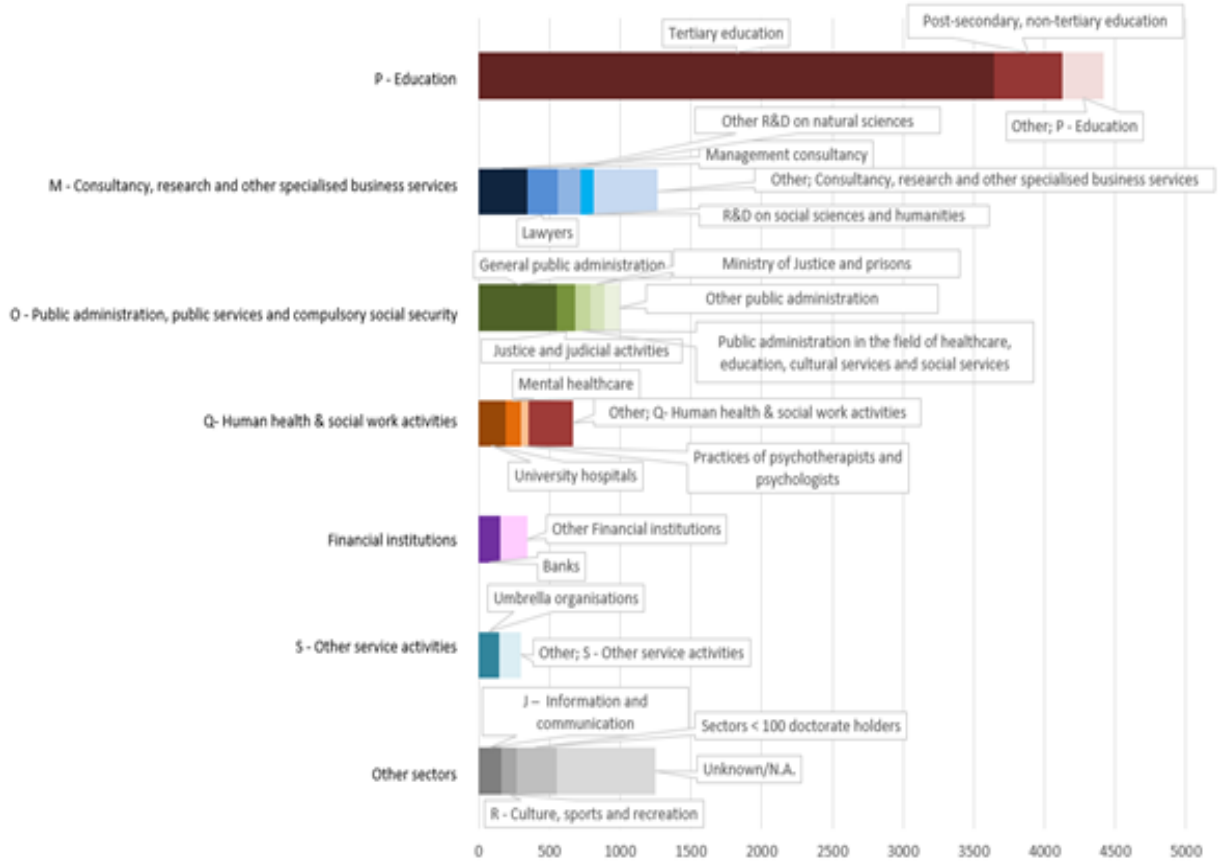
The salaries of doctorate holders in the Social Sciences (€ 82,000 average, € 74,000 median) are below average for doctorate holders in general, but higher than the salaries of high-educated persons in the Netherlands. They earn more working outside academia than within (€ 87,000 vs € 75,000).

The share of doctorate holders who work part time (10%) is above average. There are far fewer part-time positions at universities than outside academia (7% vs 12%). The percentage of doctorate holders who obtained their previous degree abroad is relatively low in the Social Sciences (4%).

7.2 The role of the doctorate in the doctoral holder's work

Doctorate holders in the Social Sciences who work outside academia are more likely than average to engage in research (80%), but the amount of time they spend on research is below average (52% of their time). There is a relatively close relationship between their work and their doctoral research, with 68% indicating that their work is closely or partly related to their doctoral research.

Figure 7: Business sectors employing doctorate holders in the Social Sciences



Statistics Netherlands: Microdata Careers of Doctorate Holders 2014

Doctorate holders in the Social Sciences work most often in the education sector (48%). This is mainly because a large number of them work for a university, but even leaving aside university appointments, 5% still work in education. Beyond the university, they work in the private sector: consultancy, research and other specialised business services (14%), followed by public administration, public services and compulsory social security (11%).

The sector human health and social work activities is a medium-sized employer of doctorate holders in the Social Sciences (7%). Two other reasonably large groups of employers are financial institutions (4%) and other service activities (3%).

The largest groups of employers in the private sector are management and business consultancies and law firms. It is notable that relatively few doctorate holders are employed to do sector-specific R&D on the social sciences or the humanities, and that almost twice as many work in R&D on ‘other natural sciences’.
Those doctorate holders employed in public administration work most often in general public administration. Another relatively large group works in justice and judicial activities. In post-secondary, non-tertiary education, more than half of doctorate holders work in higher professional education. Very few are employed in other educational sectors. The human health and social work activities sector is divided into three major subgroups: university hospitals, mental health and substance abuse hospitals, and the practices of psychotherapists and psychologists. The financial institutions sector consists mainly of banks, insurers, financial holdings and stockbrokers. Half of the ‘other service activities’ category consists of umbrella organisations and cooperative and advisory bodies (not in the field of health care, welfare, sports and recreation).

Within these sectors, there are a number of commonplace occupations that reveal the full breadth of the field: psychologist, policy adviser, business manager and management consultant, lawyer, judge, legal specialist, mathematician / actuary / statistician, economist, and specialist in educational methodologies.

7.3 What doctorate holders think of their doctorate and career

Eighty-four percent of doctorate holders in the Social Sciences feel that their doctorate has had added value for their career. This percentage is about average for all doctorate holders. There is scarcely any difference between those who work for a university and those who do not. Like virtually every other group of doctorate holders, they believe that the added value lies in their being better prepared to do their work. Second in importance is that their doctorate improves their job opportunities. In their responses to the open questions, they claim that a doctorate is required for many different jobs, in research and beyond.

Other frequently mentioned reasons are greater prestige in the Netherlands and abroad and good research skills or knowledge of the subject matter.

A considerable percentage of doctorate holders in this field engage in research. Of the 14% who do not and who work for a university, the most important reason for not pursuing a research career is the lack of research places.
Outside the university, their reasons vary from not being interested in research to a lack of research places and not having clear career opportunities in research. Almost half of the respondents in non-research positions also give other reasons for not pursuing a research career. The one cited most often is that research is not part of their job. Another concerns working conditions in university research, with frequent reference being made to pressure to perform/competition.

Doctorate holders in the Social Sciences are generally satisfied with their working environment, with around 90% indicating that they are satisfied or very satisfied. This is about average for all doctorate holders. Those working at a university are somewhat more satisfied with their degree of independence, but often less satisfied with their job security. Doctorate holders in the Social Sciences who work outside academia are less satisfied with the intellectual challenge of their work than those employed at a university (83%), but that percentage is comparable to the average for doctorate holders employed in a non-university setting. Given the level of satisfaction about their working environment, it is notable that the percentage of who say that they would do a doctorate again if they had to restart their career is below average (88% at a university, 78% in a non-university setting). The latter percentage (of those in non-academic employment) is the lowest of all the fields of study.

7.4 Conclusion: Impact of doctorate holders in the Social Sciences

Doctorate holders in the Social Sciences have a good position in the job market: their unemployment rate is low, and their salaries are more or less on par with other doctorate holders. A relatively large percentage of doctorate holders in this field are employed at a university. Outside the university, they make relatively frequent use of their research skills in their work compared with the other groups, and the relationship between their work and their doctoral research is relatively close. They are satisfied with their working environment but see relatively little added value in their doctorate. The job market position of doctorate holders in the Social Sciences differs notably from that of their counterparts in the Humanities.

8 Humanities

The Humanities accounts for 7% of all doctorate holders. That makes it one of the smallest fields of study. National figures show that the number of doctorates awarded in the Humanities each year has risen by 87% over a 25-year period. The job market position of a doctorate holder in the Humanities is less promising than that of doctorate holders in other fields.

8.1 Demand for doctorate holders in the Humanities

Thirty-seven percent of doctorate holders in the Humanities work at a university. That is above average (30%). The longer ago they received their doctorate, the smaller the percentage still employed at a university, but regardless of the cohort, the percentage working in academia is above average. Doctorate holders in the Humanities have a less promising job market position than other doctorate holders; their unemployment rate is relatively high (3%) and they have a larger percentage of temporary contracts (25%) and part-time work (16%).

Their salaries are also clearly lower than those earned in the other fields (€ 61,000 average). Doctorate holders in the Humanities who work for a university earn more on average than those who do not. In all the other disciplines, the opposite is the case.[18] This is especially clear among the older cohorts. In the younger cohorts, the difference is negligible. Doctorate holders in the Humanities tend to have far fewer part-time positions at universities than outside academia (11% vs 19%). Beyond academia, the percentage of temporary appointments is very high compared with other fields (20%).

The percentage of doctorate holders in the Humanities who took their previous degree abroad is slightly above average (8% vs an average of 7%). This percentage has increased over time and is higher among those employed at universities.

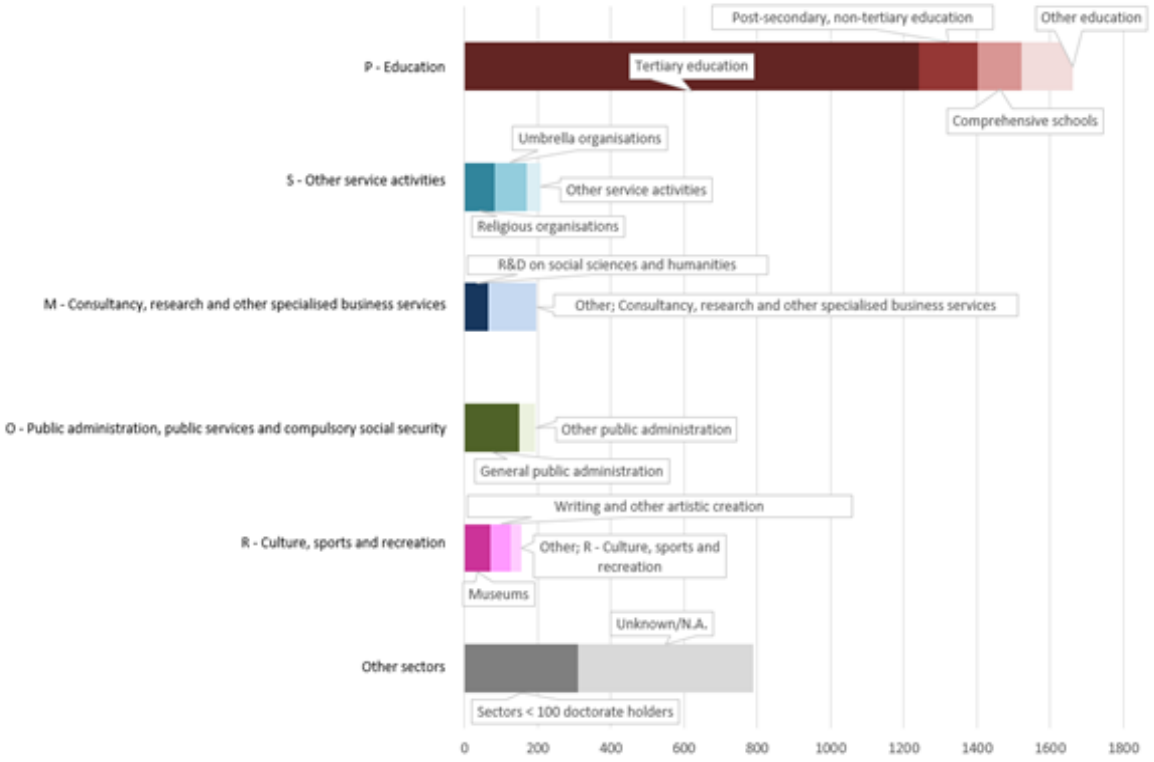
[18] In the Humanities, the differences between the two groups are precisely the same, whether we take the average or the median. In other sectors, taking the median produced a less pronounced difference than the average. That is because the outlier values (doctorate holders who earn much higher salaries) push the average upwards but are excluded from the median.

8.2 The role of the doctorate in the doctoral holder's work

About 70% of doctorate holders in the Humanities state that their work is related (at least in part) to their doctoral research. The breakdown is 88% of those employed at a university and 55% of those who are not. Although the latter is more than half, it remains one of the lowest percentages among all doctorate holders. Only the Natural Sciences comes close.

The vast majority (77%) of doctorate holders in the Humanities engage in research and therefore make use of the research skills that they acquired during their doctoral training. Outside academia, 6% of doctorate holders in the Humanities work as researchers. This percentage is below average and comparable to that in the Medical and Health Sciences. Doctorate holders in the Humanities spend an average of 51% of their time on research.

Figure 8: Business sectors employing doctorate holders in the Humanities



Statistics Netherlands: Microdata Careers of Doctorate Holders 2014

Even leaving aside university staff, the largest group of doctorate holders in this field works in the education sector (24%). They tend to work in post-secondary, non-tertiary education and for comprehensive schools. Next in line are other service activities, consultancy, research and other specialised business services, and public administration (10% for all three) and, finally, the culture, sports and recreation sector (8%). If we look at these sectors in greater detail, we see that their attributes are clearly related to the field in which the doctorate holders earned their degree: R&D on social sciences and humanities, museums and religious organisations. In addition, a relatively large number of Humanities doctorate holders work for umbrella organisations and cooperative and advisory bodies or in general public administration. Their occupations correspond accordingly: researcher, secondary school teacher, policy consultant, archivist and curator, philosopher, historian and political scientist, sociologist and anthropologist, theologian and minister, author and technical writer, and translator, interpreter and linguist.

8.3 What doctorate holders think of their doctorate and career

Doctorate holders in the Humanities have a positive opinion of their doctorate, but less positive than doctorate holders in other fields. Seventy-eight percent feel that their doctorate degree has had added value for their career. This is a considerable majority, but it is still the lowest percentage of all fields. That is because fewer doctorate holders in the Humanities who work outside academia say that their doctorate has had added value for their career (69%).
Approximately 87% of doctorate holders in the Humanities are satisfied with their current working environment. Although that is a large percentage, it is the lowest of all fields. It is mainly doctorate holders working outside the university who are relatively less likely to be satisfied: 84% are satisfied, compared with 92% of those employed at a university. They are relatively less satisfied with virtually every aspect of their work, the lowest score being for intellectual challenge (67% are satisfied compared with an average of 83% among all doctorate holders).
Despite the less positive attitude towards their working environment and career, 85% of doctorate holders in the Humanities would do their doctorate again if they had to restart their career. This percentage is above average among doctorate holders, and for those working outside the university it is in fact one of the highest percentages (83% vs 81% average). For this group, the value of a doctorate seems to be relatively unrelated to their position in the job market.

8.4 Conclusion: Impact of doctorate holders in the Humanities

There is a demand in the job market for doctorate holders in the Humanities. They have a lower rate of unemployment than the general population of high-educated persons in the Netherlands, and they earn slightly more. Compared with other doctorate holders, however, the job market position of those in the Humanities is weaker: they are more likely to be unemployed, they earn less, and they are more likely to work on a temporary contract, even outside the university. Some of these attributes can likely be explained by the sectors in which Humanities doctorate holders tend to work. Salaries in the non-profit sector, for example, are generally lower, and the percentage of flexible contracts in culture, sports and recreation and other service activities is higher than in other sectors (source: CBS StatLine).

An ample majority of doctorate holders have jobs that are related to their doctorate research, at least in part. More than half of the doctorate holders in the Humanities engage in research. They therefore do make use of the expertise and skills that they acquired during their doctoral training. However, this is a much smaller percentage than in other fields, a point that seems to be reflected in the level of satisfaction that they feel with their work. Although the majority are satisfied with their job, they are less satisfied than other doctorate holders. More doctorate holders in the Humanities would do their doctorate again if they had to restart their career, however. It appears that there is only a relatively weak relationship between their job market situation and the decision to do a doctorate. We may conclude that doctorate holders in the Humanities do have an impact on society. There seems to be little room for a steep increase in their numbers.

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