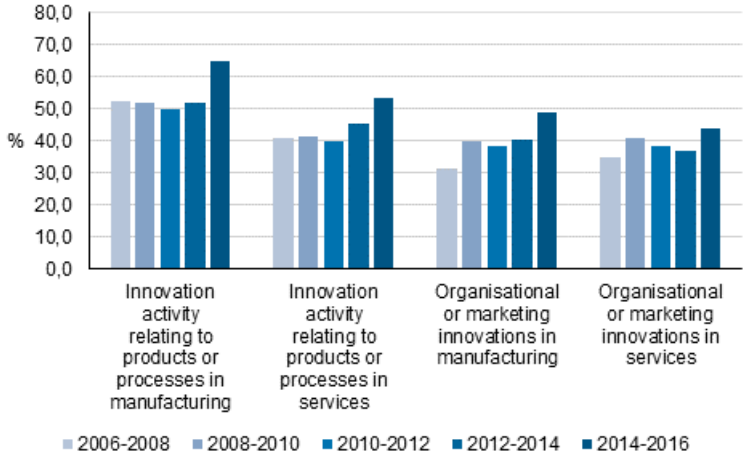
Innovation activity 2016

Innovation activity more widespread than before among enterprises in 2014 to 2016

Enterprises reported innovation activity more frequently than before in 2014 to 2016. Altogether, 65 per cent of the surveyed enterprises had had innovation activity, while in earlier surveys, the corresponding share has been some 10 percentage points lower. These data derive from Statistics Finland's survey that examined the generality and characteristics of enterprises' innovation activity. The survey is part of the EU survey made every two years.

Prevalence of innovation activity in manufacturing and services in 2006 to 2016, share of enterprises



In the most recent survey, innovation was reported on the whole more often than before, in both enterprises of different size categories and different innovation types, for example.

Forty-three per cent of the surveyed enterprises introduced new or significantly improved products to the market and in all, 58 per cent of the enterprises reported innovation activity related to products and processes, the share having risen by some 10 percentage points from the previous survey. The share of enterprises having reported organisational and marketing innovations also rose significantly from the previous survey, by good seven percentage points, and was now 46 per cent of all enterprises.

The expenditure of innovation activity remained in 2016 on level with previous surveys, at around EUR six billion. However, there was a change in the structure of expenditure from before, because as R&D expenditure decreased, growth in innovation investments and inputs in introducing products to the market increased clearly the share of other, non-R&D expenditure. EUR 4.3 billion of innovation expenditure were spent in manufacturing enterprises and EUR 1.7 billion in service activities.

In the survey, lack of skilled personnel emerged as the factor most commonly hampering innovation activity. Absence of own funding and high costs of innovation activity, as well as market factors, that is, hard competition and uncertain demand for innovations, are still challenges for innovations. Legislation can have a stimulating, disturbing or neutral effect on innovation activity. For example, for seven per cent of innovators, environmental legislation appeared as stimulating innovation activity, 11 per cent assessed data protection legislation to cause uncertainty in innovation activity, and similarly, 11 per cent felt product safety and consumer production legislation causes additional burden on developing new.

In addition to innovation cooperation, the survey studied the cooperation of enterprises and universities and its results more widely. Around one-fifth of enterprises reported cooperation with universities in 2014 to 2016. The share of those having reported cooperation was bigger in manufacturing than in services and in most industries, it was mostly cooperation related specifically to innovation activity. Of the results of the mentioned university cooperation, enterprises thought most important were strengthening of knowledge base and competence, overviews of future development trends and markets, introduction of new technologies, methods or devices, and development of new and improved products.

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1. About the Innovation Survey

The Innovation Survey 2016 is part of the EU Community Innovation Survey 2016 (CIS2016) project coordinated by Eurostat, the Statistical Office of the European Union. The survey has been conducted in all Member States. The aim of the survey conducted every second year is to examine the prevalence and characteristics of the innovation activity made in enterprises.

In addition to questions from the EU's harmonised questionnaire, the survey also included national questions on topical issues; big data and open public sector data and digitalisation in enterprises' business activity and cooperation between enterprises and universities.

The survey targeted a three-year period from 2014 to 2016 and covered enterprises employing at least ten persons in manufacturing – including mining and quarrying, electricity, gas and air-conditioning supply, and water supply and waste management – and in certain service industries. A more detailed description of the target population with the rest of the methodological description is included in the quality description on the home page of the statistics (only in Finnish).

The results of the survey can be found on the homepage of the statistics at http://tilastokeskus.fi/til/inn/index_en.html. Data in tables can be found in the appendix tables of this publication and in the database tables on the home page http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin__ttt__inn/

2. Prevalence of innovation activity in enterprises

Of the surveyed enterprises, 65 per cent reported that they had had innovation activity in 2014 to 2016. This was about ten percentage points more than in previous surveys, where the share of those reporting innovation activity has varied between 52 and 56 per cent.

The majority of those having had innovation activity engaged in innovation activity related to products and processes. In all, 58 per cent of enterprises reported development or implementation of product and process innovations, which is also considerably higher than before. In previous surveys, nearly one-half of enterprises have reported innovation activity related to products and processes. Implementation of marketing and organisational innovations was also reported more often than earlier. They had been adopted by 46 per cent of enterprises, while in earlier surveys, the share has been nearly 40 per cent.

Although for services, innovation activity appeared to have become more general already in the previous survey, now the implementation of innovations became clearly more common throughout; for all types of innovation activity, both in manufacturing and services, and also in all size categories.

Figure 1. Prevalence of innovation activity in 2006 to 2016, share of enterprises

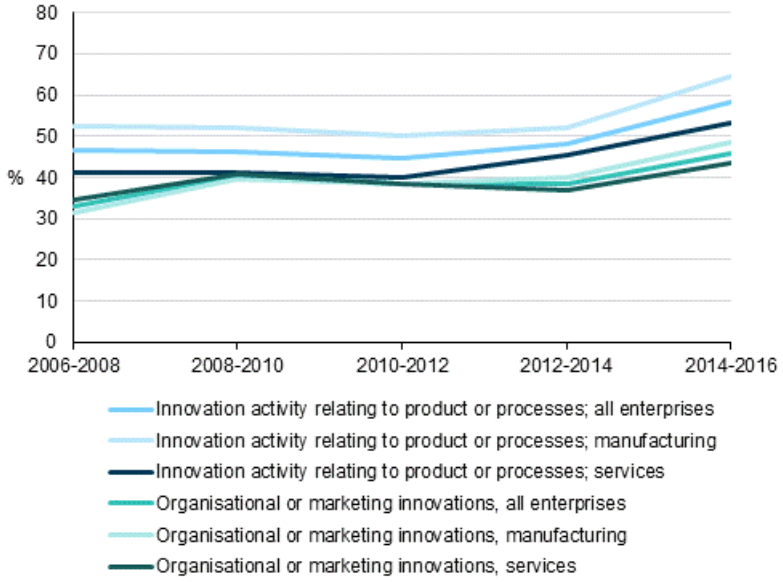
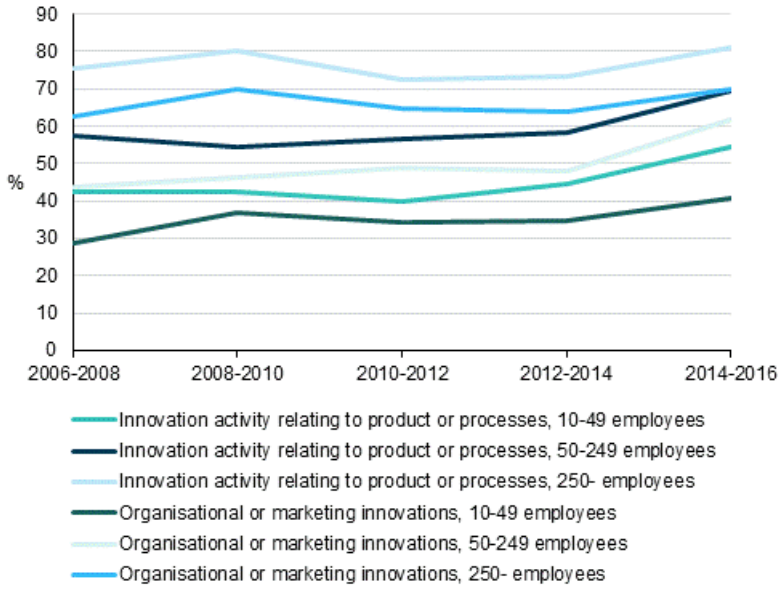


Figure 2. Prevalence of innovation activity by size category of personnel in 2006 to 2016, share of enterprises



In manufacturing, seven out of ten enterprises reported innovation activity in 2014 to 2016. In services, the respective share was 60 per cent.

As in the previous surveys, enterprises in the manufacture of computer, electronic and optical products reported innovation activity most commonly, 92 per cent of all enterprises in the field. In services, the share of those with innovation activity was highest – as in previous years – in computer programming, where 89 per cent of enterprises had had innovation activity.

In some industries, the shares of those reporting innovation activity remained relatively unchanged from one year to another, and the same industries are often found in the top positions of the comparison. The share of the manufacture of computer, electronic and optical products has been close to 90 per cent already in a couple of surveys, the share of the manufacture of chemicals and chemical products has been at around 80 per cent and the paper industry between 60 to 70 per cent. The share has varied on both sides of 70 per cent in the manufacture of machinery and equipment, while in services, telecommunications, information service activities and research have shown similar figures.

The increase seen in total results for those having reported innovation activity concerned now more or less the entire business activity, because the share of those having reported innovation activity grew in nearly all industries compared with the previous surveys.

Figure 3. Prevalence of innovation activity in manufacturing by industry in 2014 to 2016, share of enterprises

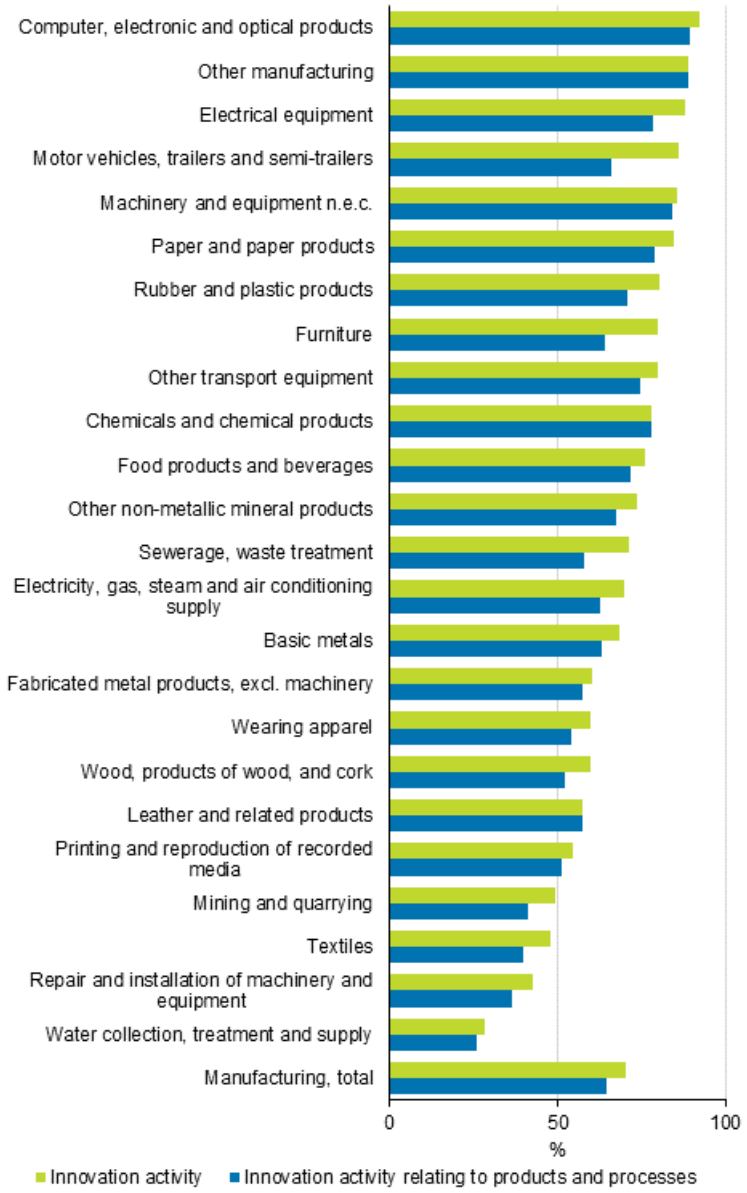
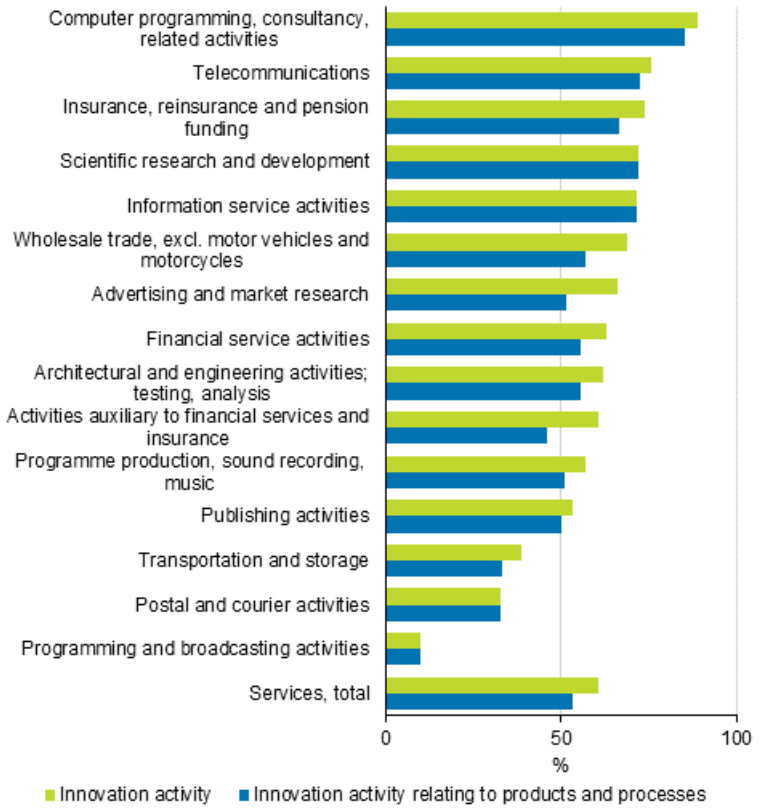
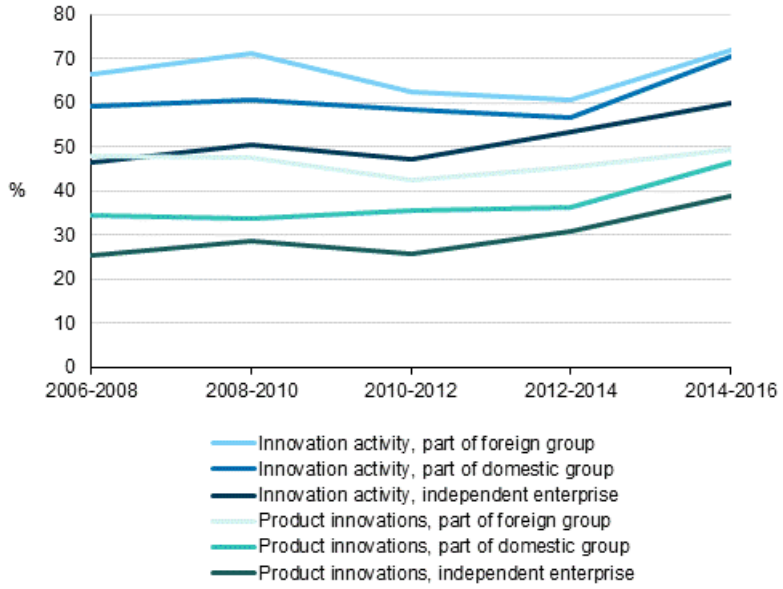


Figure 4. Prevalence of innovation activity in services by industry in 2014 to 2016, share of enterprises



Enterprises belonging to groups, particularly to foreign groups, have conventionally reported innovation activity more often than independent enterprises, but the difference seems to have narrowed down somewhat. When in 2006 to 2008, every fourth independent enterprise reported introduction of product innovations and 46 per cent innovation activity at all, the shares were 39 and 60 per cent in 2014 to 2016. Compared with enterprises belonging to foreign groups, the difference of 20 percentage points has thus narrowed now to ten percentage points. Simultaneously, enterprises belonging to Finnish groups have reached the shares of innovating enterprises belonging to foreign groups, and even passed them in the prevalence of process innovations.

Figure 5. Prevalence of innovation activity by form of enterprise in 2006 to 2016, share of enterprises



Innovation activity also becomes more commonplace the wider markets the enterprises operate on. In the light of the results, this is particularly visible in the introduction of product innovations to the markets and implementation of marketing innovations. For example, 30 per cent of those operating only in domestic markets introduced product innovations in 2014 to 2016. Sixty-one per cent of enterprises that had markets outside the EU launched product innovations.

3. Innovation activity related to products and processes

Of the surveyed enterprises, 58 per cent reported having developed or introduced product or process innovations in 2014 to 2016. This is ten percentage points more than in the previous survey.

3.1 Every tenth turnover euro from innovative products

Of the enterprises, 43 per cent reported that they had implemented product innovations to the markets in 2014 to 2016. In manufacturing, the share was 45 per cent and in services, 41 per cent. In manufacturing, introduction of product innovations naturally focuses on goods but as the share of those having launched services has also grown considerably, the share of enterprises that have launched services was now good one-fifth of enterprises, while it has been 14 per cent in previous surveys. In services, the shares of both those having introduced new goods and new services to the markets have similarly grown.

The share of enterprises in the smallest size category having introduced product innovations to the markets was 39 per cent, and in the biggest size category it was 69 per cent. In relative terms, introduction of innovative services to the markets has increased most in small and medium-sized enterprises in recent years.

In manufacturing, the share of those having introduced product innovations to the market was biggest, 78 per cent of the enterprises in the industry, in the manufacture of computer, electronic and optical products. The majority of these enterprises reported product innovations but 45 per cent of enterprises in the industry had introduced service innovations.

As in the previous years, the share of those having introduced product innovations to the markets was biggest in services in computer programming, where 76 per cent reported product innovations. Most of them reported service innovations, but product innovations are also common in the field, as one-half of those having innovated reported them.

Figure 6. Introduction of product innovations in manufacturing by industry in 2014 to 2016, share of enterprises

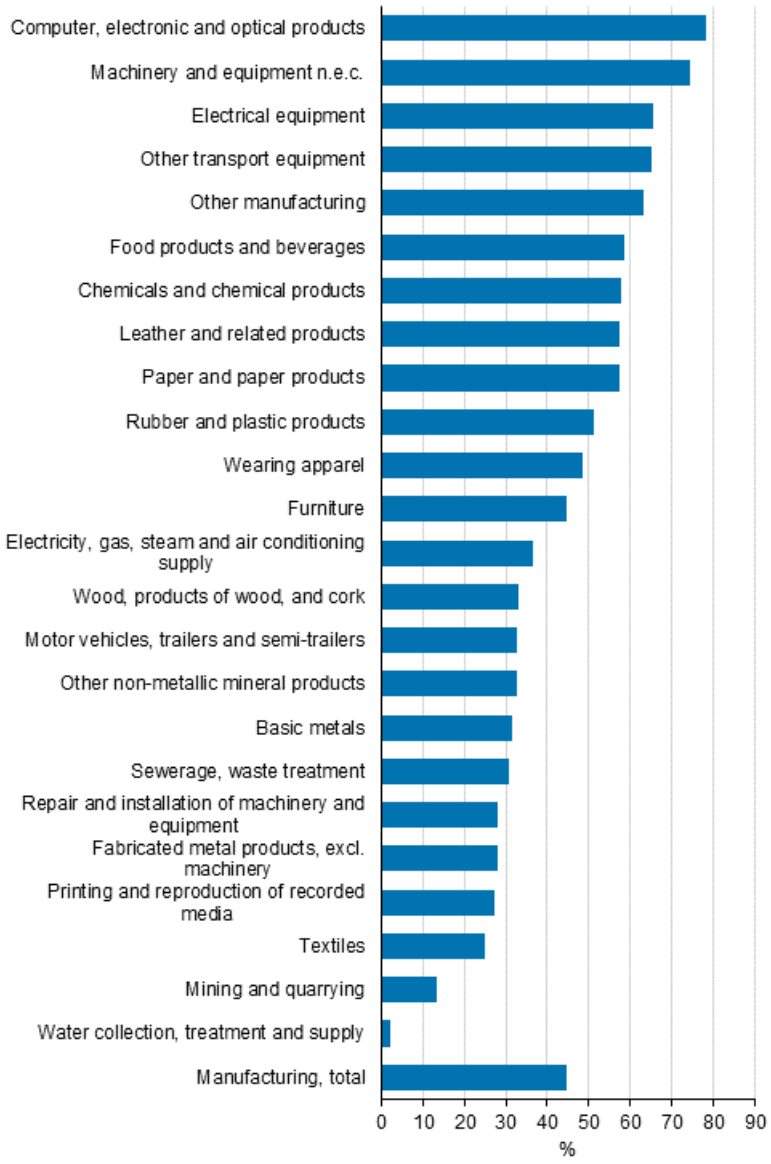
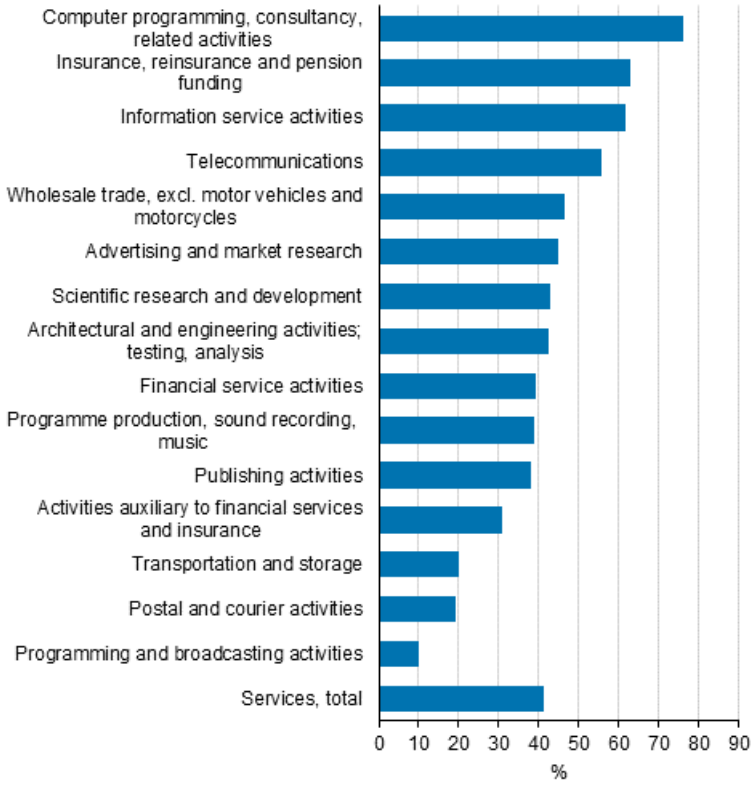


Figure 7. Introduction of product innovations in services by industry in 2014 to 2016, share of enterprises



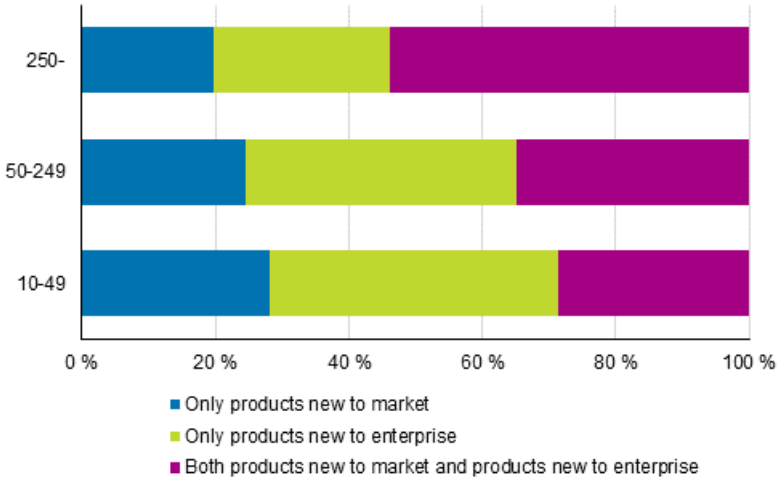
The image of the developer that has originally developed the product innovations introduced to the markets has remained fairly similar from one year to the next. The majority of those having introduced product innovations to the markets have developed innovations by themselves. Good one-half reported having developed innovations together with other enterprises or organisations, and around one in three has produced such product innovations that were remodelled products originally developed by others.

An overview of how large share of those having introduced product innovations to the markets has launched products with different novelty values has remained very similar in recent years. To be an innovation the product must be new or significantly differing from before at least to the enterprise producing it. The Innovation Survey classifies product innovations by type into two groups according to whether innovations were new only to the enterprises that produced them – that is, corresponding ones have already been on the market – or whether innovations were new also to the market – that is, corresponding products have not been previously available.

Nearly two-third of those having reported product innovations in 2014 to 2016 said they launched both products that were new to the enterprise's production, but not to the markets, and products that were also new to the enterprise's markets. Good 40 per cent introduced only product innovations that were new from the viewpoint of own production to the market, and around one in four enterprises said their product innovations were new for its markets.

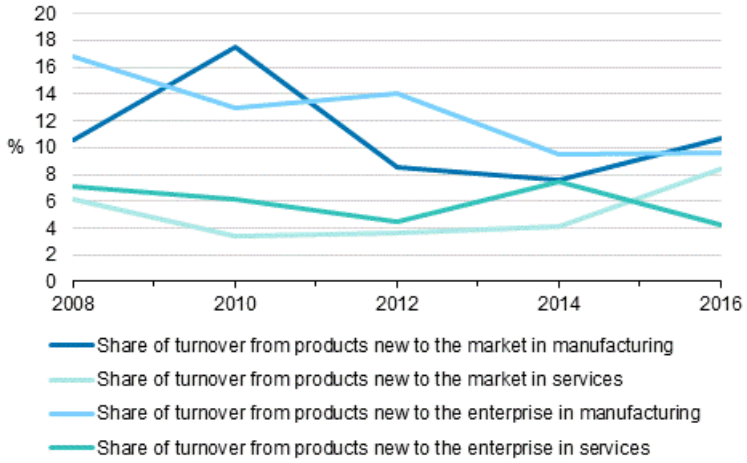
Twenty-nine per cent of the smallest size enterprises having introduced product innovations to the markets reported launching of both new products to the markets and products only new to the enterprise. For large enterprises, the share was correspondingly 54 per cent.

Figure 8. Distribution of product innovations by novelty value and size category of personnel in 2014 to 2016, share of those with introductions of product innovations to the markets



In 2016, around 10 per cent of the turnover of those having introduced product innovations to the market came from new products to the markets, the share being 11 per cent in manufacturing and eight per cent in services. The share of turnover for those innovations that were new only to the enterprises having produced them was seven per cent, in manufacturing enterprises 10 per cent and in services four per cent.

Figure 9. Share of turnover derived from product innovations in manufacturing and services in 2006 to 2016, share of turnover of enterprises having introduced product innovations to the markets



The turnover derived from new products to the market represented good six per cent of the combined turnover of all enterprises in the survey. The turnover from products new only to the enterprises, in turn, formed five per cent of the combined turnover of all enterprises. In all, around 11 per cent of the turnover of the examined industries in 2016 came from product innovations launched on the market during 2014 to 2016. This is on the same level as in the previous surveys.

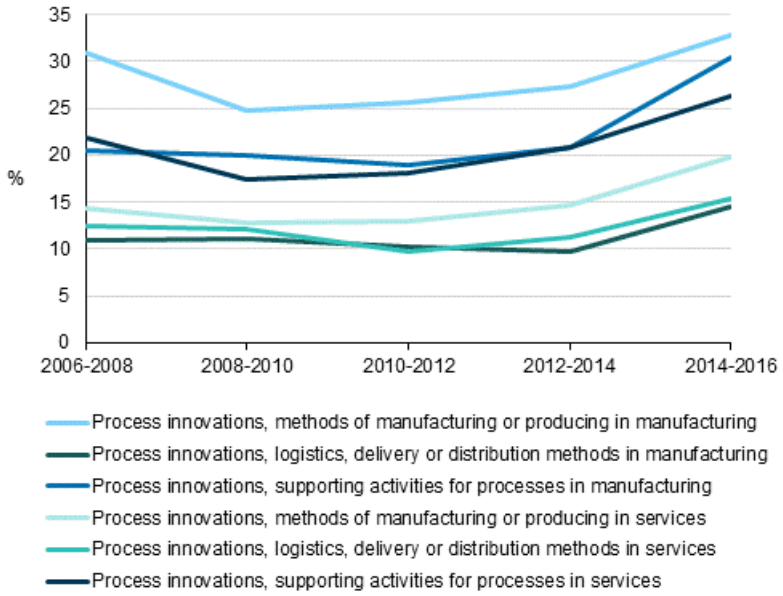
3.2 Nearly every second manufacturing enterprise renewed its processes

Altogether, 41 per cent of the surveyed enterprises implemented process innovations in 2014 to 2016. As in other innovation activity, this was clearly more than in previous surveys, when nearly one-third of enterprises reported process innovations.

In manufacturing, the share of enterprises having implemented process innovations was 47 per cent and in services 36 per cent. Of manufacturing industries, process innovations were reported most often by the manufacture of paper and paper products, the manufacture of other non-metallic mineral products and the manufacture of electrical equipment. For example, in the paper industry, process innovations were reported by 69 per cent of enterprises. In services, the implementation of process innovations was most common in computer programming, where 58 per cent reported innovations.

In the survey, process innovations are divided into innovations related to production methods, distribution methods and supporting activities. Enterprises most commonly reported innovations related to supporting activities serving enterprises' processes.

Figure 10. Prevalence of process innovations in manufacturing and services in 2006 to 2016, share of enterprises



While three-quarters of those having introduced product innovations in the markets developed product innovations by themselves, for process innovations the share was 56 per cent. In all, 58 per cent of those having adopted innovative processes reported having developed innovations together with other enterprises or organisations, and one quarter said they had adapted or remodelled process innovations originally developed by others.

3.3 Every third had projects related to development and implementation of product and process innovations

Innovation activity related to products and processes also includes projects and activities that do not, for one reason or another, result in completion and implementation of innovations during the reference period – either due to suspension of the activity or the activity still continuing. In all, 35 per cent of enterprises reported such projects or activities. In all, 12 per cent of enterprises reported projects suspended before completion and one-third of enterprises had projects and activities aiming at innovations that still continued after the end of the survey period at the end of 2016.

3.4 Change in the structure of innovation expenditure

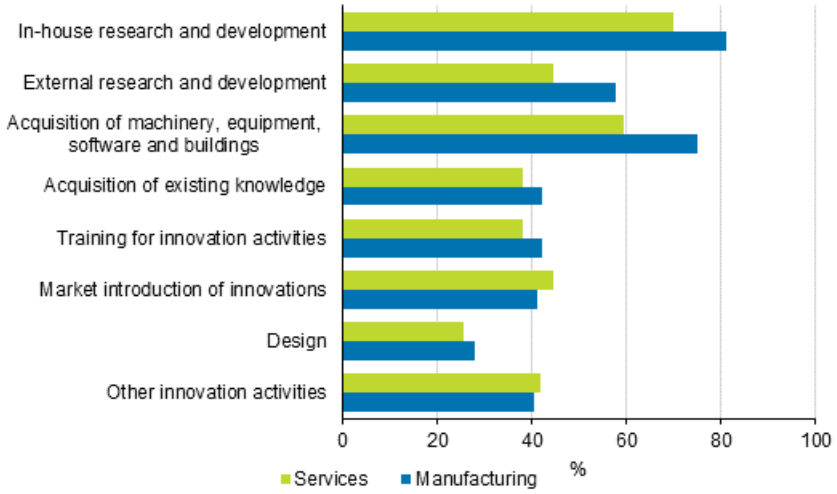
The generality of various actions related to innovation activity was as a whole similar to previous years in 2014 to 2016. Three in four enterprises with innovation activity related to products and processes were engaged in their own research and development (R&D). Around one-third of enterprises with innovation activity had regular R&D, meaning that the enterprise had its own permanent R&D personnel, and 41 per

cent of enterprises reported occasional R&D. All in all, 51 per cent those with innovation activity had commissioned research and development activity from outside the enterprise.

Two out of three had made equipment and machine acquisitions related to innovation activity, and 40 per cent had acquired existing competence and knowledge, work protected by copyrights or patented and non-patented inventions or the like from enterprises or organisations for developing new or essentially improved products and processes. Forty per cent of enterprises with innovation activity reported training related to innovation activity, 43 per cent activities related to market introduction of innovations and 27 per cent design related to product innovations.

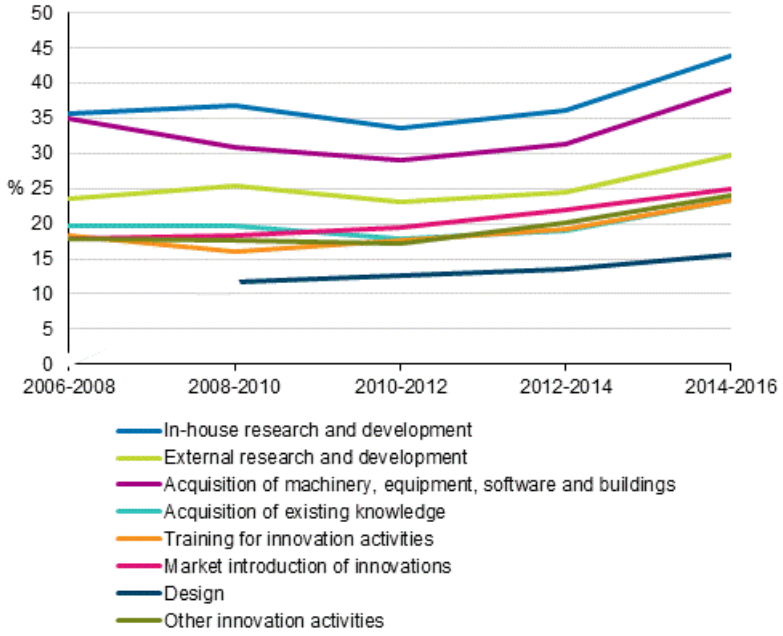
Apart from R&D and machine and equipment acquisitions related to innovation activity, various activities appear more or less as generally in the innovation activity of manufacturing and service industries.

Figure 11. Prevalence of various types of innovation activity in manufacturing and services in 2014 to 2016, share of enterprises with innovation activity related to products and processes



The characteristics of innovation activity and prevalence of various types of innovation activity thus appeared similar to before among those having had innovation activity. When examining innovation activity relative to the entire targeted enterprise group, we can see that activities have become more general particularly for R&D and acquisitions of innovative machines, equipment and the like. For other activities, they have become more common moderately positively.

Figure 12. Prevalence of various types of innovation activity in 2006 to 2016, share of enterprises

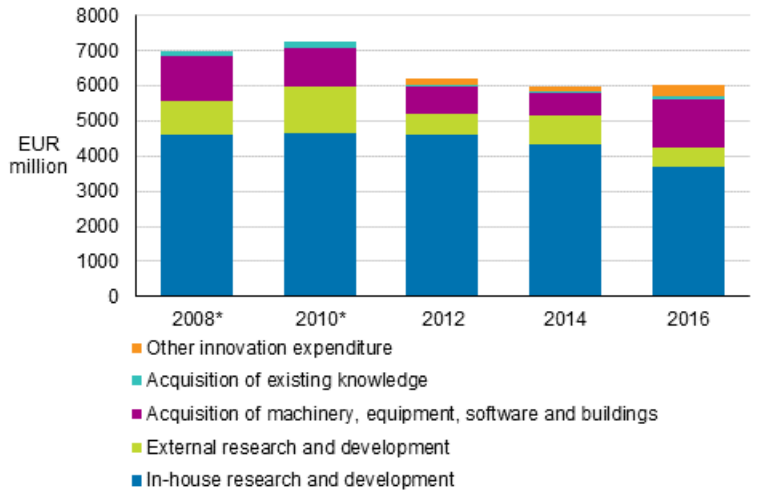


The expenditure of innovation activity reported by enterprises in 2016 remained on the whole on level with the previous survey, that is, of 2014, when they were close on EUR six billion. In 2016, expenditure totalled a bit over EUR six billion, EUR 4.3 billion in manufacturing and EUR 1.7 billion in services.

A significant structural change took place in the innovation expenditure of manufacturing, because the expenditure of research and development still fell considerably from previous surveys and, on the other hand, machine, equipment, software and building investments on innovation activity related to other than R&D grew considerably. The latter was closely influenced by investments of the forest industry and related innovative acquisitions.

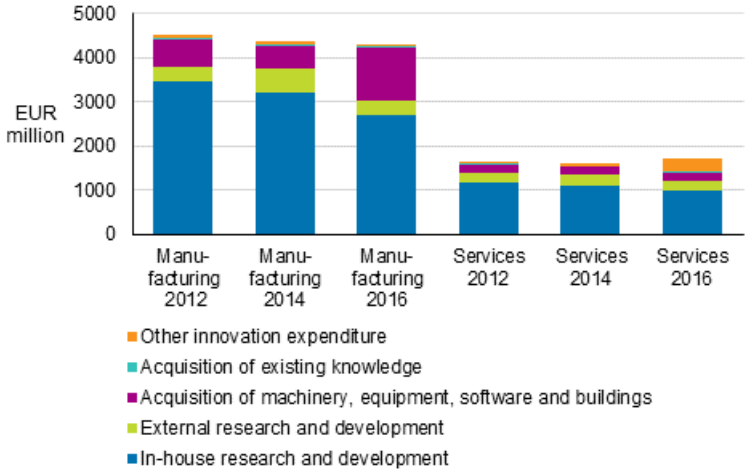
In services, the decrease in R&D expenditure was compensated by growth in other innovation expenditure, particularly as concerns market introduction of products. In this respect, a significant addition was recorded in the banking and insurance sector.

Figure 13. Distribution of innovation expenditure in 2008 to 2016, EUR million



* Instead of 'Acquisition of existing knowledge' 'acquisition of external knowledge', and not covering 'Other innovation expenditure

Figure 14. Distribution of innovation expenditure in manufacturing and services in 2012 to 2016, EUR million



3.5 Public financial support to innovation activity

In all, one-third of those having developed and implemented product and process innovations in 2014 to 2016 received public financial support for their innovation activity. In relative terms, support was received most commonly by the biggest enterprises in the target population, of which 49 per cent reported support. Thirty-four per cent of medium-sized enterprises received support and 32 per cent of enterprises employing 10 to 49 persons. Compared to the previous survey, the number of enterprises having received support to innovation activity grew clearly among the group of the smallest enterprises.

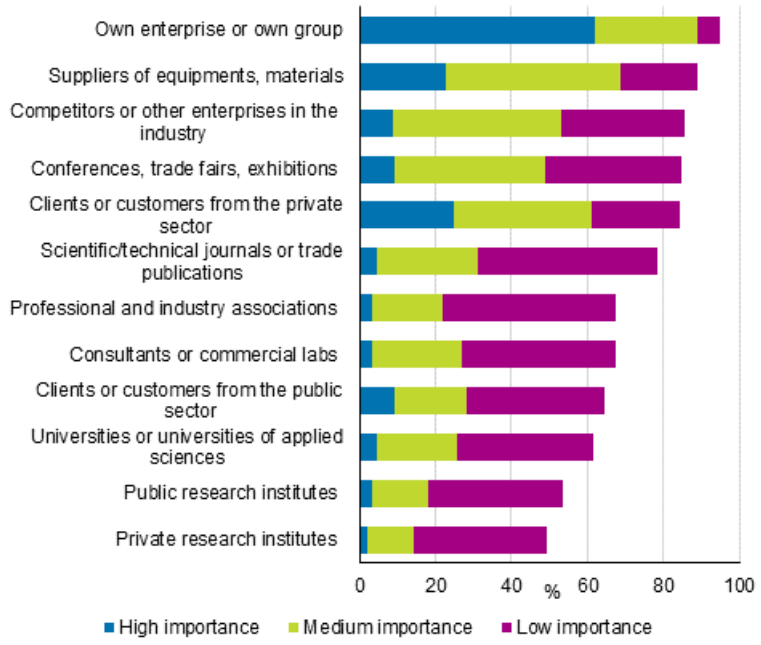
The shares of those having received support among those with innovation activity were in practice on level with the previous survey; 28 per cent received support from the State, nine per cent from local or regional authorities and six per cent from the European Union. Nearly three per cent of those with innovation activity took part in the EU 7th Framework Programme for Research and Technical Development or in the Horizon 2020 Programme for Research and Innovation.

3.6 Own enterprise and group and suppliers of equipment and materials still the most important information sources for innovation

One's own enterprise and group and suppliers of equipment and materials are still the most important information sources for enterprises' innovation activity. Enterprises feel the next most important are private sector customers, competitors or other enterprises in their industry, and conferences, fairs and exhibitions. For instance, around seven out of ten enterprises with innovation activity assessed competitors and other enterprises in the industry as significant information sources for developing innovations.

The least used information sources – as well as the least important one – are private and public research institutes.

Figure 15. Information sources of innovation activity by importance in 2014 to 2016, share of those with innovation activity related to products and processes



Information sources of innovation activity were last inquired for the years 2010 to 2012. The most recent data are on the general level very similar to those reported at that time. The importance of equipment suppliers as information sources has risen somewhat, because in the previous survey, it was recorded as having high or medium importance by 61 per cent of those having innovated products or processes, and now the corresponding share was 69 per cent.

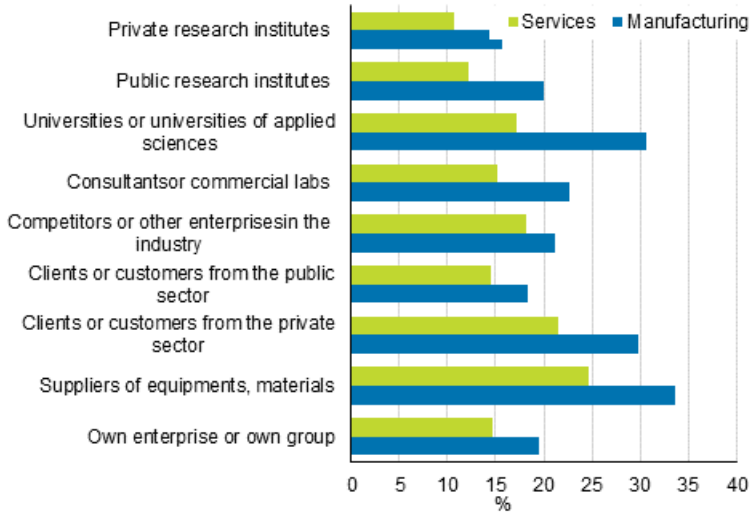
3.7 Every fifth enterprise cooperates in innovation projects

Thirty-nine per cent of those with product and process innovations had innovation cooperation, or active participation in innovation projects with other enterprises and organisations. This was 23 per cent of all enterprises in the survey.

The share of enterprises with innovation activity that cooperated has been relatively stable in recent years, slightly under 40 per cent. In the previous survey, the share was 38 per cent, and in the preceding one, 36 per cent.

In 2014 to 2016, innovation cooperation was most commonly reported with suppliers of equipment, private sector customers and universities and universities of applied sciences. Seventeen per cent of those with innovation activity had cooperated with enterprises in their own group, 29 per cent with suppliers of equipment, around one quarter with private sector customers and similarly, around one-quarter of those having innovated products and processes with universities. Cooperation was reported still more often in manufacturing than in services.

Figure 16. Cooperation related to innovation activity with different cooperation partners in manufacturing and services in 2014 to 2016, share of enterprises with innovation activity related to products and processes



In all, 95 per cent of those with innovation activity reported cooperation with domestic cooperation partners. Six out of ten of those having cooperated had collaborated with cooperation partners in other European countries, the share being 66 per cent in manufacturing and 52 per cent in services. Every fifth of those having reported innovation cooperation had had cooperation partners in the United States. Although the shares of those having reported innovation cooperation in Europe and the United States had fallen among those with innovation activity compared with earlier surveys, the share of those having cooperated did not, however, change that significantly because considerably more innovation activity was reported now than before.

4. Implementation of marketing and organisational innovations

As with the implementation of product and process innovations, the implementation of marketing and organisational innovations was also reported more often than earlier in the period 2014 to 2016. In all, 46 per cent of enterprises reported the implementation of marketing and organisational innovations, while 38 per cent of the surveyed enterprises had innovations in the previous survey.

In manufacturing, the share of those having implemented marketing and organisational innovations was 49 per cent and in services, 44 per cent. Thirty-two per cent of enterprises reported marketing innovations in manufacturing and similarly, 32 per cent in services. Forty per cent of manufacturing enterprises had implemented organisational innovations, while the share was 36 per cent in services.

In manufacturing, organisational innovations were most commonly reported in the manufacture of motor vehicles, 63 per cent, in the manufacture of computer, electronic and optical products, 59 per cent, and in the paper industry, 57 per cent. The share of enterprises having implemented marketing innovations was highest in other manufacturing, 55 per cent of enterprises.

In services, the share of those having implemented organisational innovations was highest in insurance activities, 64 per cent, and similarly in computer programming, 64 per cent of enterprises in the industry. The implementation of marketing innovations was most common in computer programming, where they were reported by 63 per cent of enterprises.

Organisational innovations are still most often directed to business practices, but in practice, innovations related to organising responsibilities and decision-making are also equally important or common. Marketing innovations are most commonly directed to sales promotion.

Figure 17. Prevalence of implementation of organisational innovations in 2006 to 2016, share of enterprises

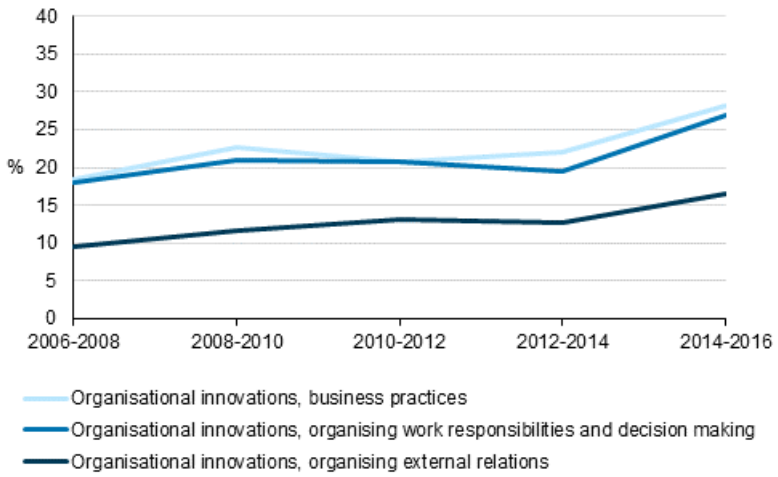
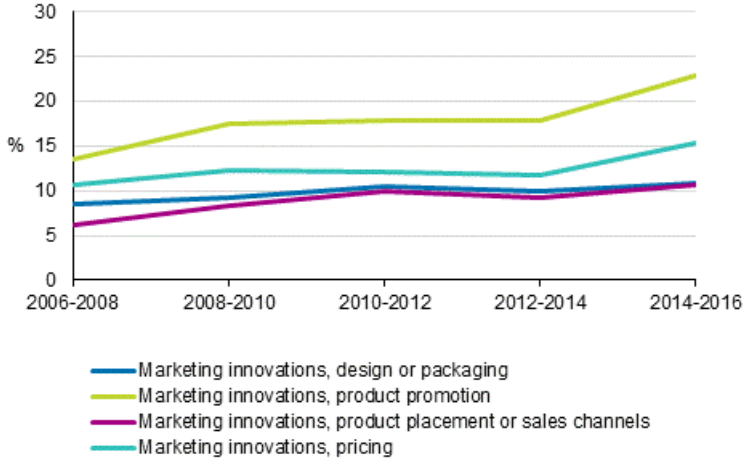


Figure 18. Prevalence of implementation of marketing innovations in 2006 to 2016, share of enterprises

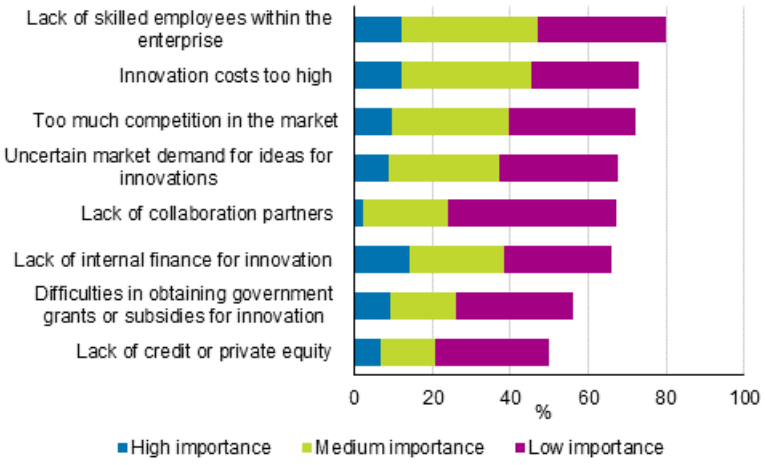


5. Factors hampering innovation activity

Previously, questions on factors hampering innovation activity have only concerned innovation activity related to the development and implementation of products and processes. The results for 2008 to 2010 showed at the time that the most significant challenges were lack of internal finance and skilled employees.

In the most recent survey, factors hampering innovation activity were inquired concerning all possible innovation activity, not just related to products and processes. This time, lack of skilled employees, lack of internal finance as well as high costs of innovation activity also emerged as the main challenges. In addition to uncertainties related to demand, the competition in the market causes concern in innovation activity.

Figure 19. Factors hampering innovation activity by importance in 2014 to 2016, share of those with innovation activity



Disadvantages were felt on the whole more commonly and more significantly in manufacturing than in services. For example, 45 per cent of those with innovation activity felt lack of internal finance was a high or medium high hampering factor, in services this share was one-third of enterprises. One-half of manufacturing enterprises assessed lack of skilled employees an important factor hampering innovation activity, in services, this was felt by 44 per cent of innovators.

Lack of finance and high costs of innovation were a high hampering factor more often for small than big enterprises. In turn, competition appeared in relation as usually a high or medium challenge for enterprises of different sizes, and lack of skilled employees was a real problem for all size categories, particularly for medium-size enterprises of which over one-half assessed it as a high or medium high factor hampering innovation activity.

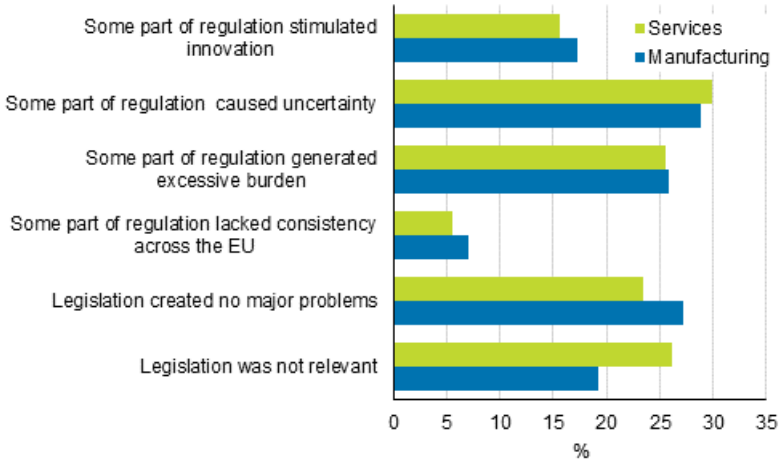
6. Effect of legislation and regulations on innovation activity

Now for the first time, enterprises were asked in more detail about the effects of legislation and regulations on innovation activity. The question covered legislation of several fields, that is, the answers show that for an enterprise some legislation may have an advancing effect on innovation activity and some other may be felt as a burden to development, depending on the situation.

One-quarter of enterprises with innovation activity assessed that legislation did not cause significant problems to innovation activity in 2014 to 2016. In all, 16 per cent said that at least some legislation had stimulated the enterprise's innovation activity. Nearly every third, 30 per cent, assessed that some legislation had caused uncertainty in innovation activity and one quarter felt legislation had generated an excessive burden on the activity, that is, too regulatory legislation brought more burden to the enterprise than would have been necessary for attaining the objectives of legislation.

The mentioned legislation was not relevant at all for the innovation activity of around every fifth innovator.

Figure 20. Effect of legislation and regulations on innovation activity in manufacturing and services in 2014 to 2016, share of those with innovation activity



Of the mentioned legislation, environmental legislation was most commonly seen as stimulating innovation activity, and the second most commonly product safety and consumer protection legislation. The latter was also assessed most commonly as regulations generating an excessive burden and, of the mentioned regulations, it was felt most often to have lack of consistency across the EU. Four out of ten enterprises with innovation activity estimated for each of the mentioned legislation that the legislation did not cause significant problems. The results show that most uncertainty in innovation appears to be caused by data protection legislation and intellectual property rights.

The effects of legislation and regulations on innovation activity were generally seen very much alike in services and manufacturing. The share of enterprises that assessed that the mentioned legislation did not cause significant problems to innovation activity was larger in manufacturing than in services. In services, a larger share of enterprises thought that legislation was not relevant in the sense intended in the question.

The examination by size category showed that the said legislation is less relevant for the innovation activity of small enterprises than for large enterprises. Product safety and consumer protection legislation, and operational and worker safety legislation stimulate the innovation activity of the largest enterprises more often than any other legislation. Environmental legislation and intellectual property rights particularly stimulate the innovation activity of manufacturing enterprises and data protection legislation that of services.

Table 1. Effects of legislation or regulations on enterprises' innovation activities by size category of personnel 2014-2016, share of enterprises with innovation activity

Size category of personnel/ Legislation or regulation	Stimulated innovation	Created no major problems	Created uncertainty	Generated an excessive burden	Lacked consistency across the EU	Not relevant
	%	%	%	%	%	%
10–49 employees						
Product safety / consumer protection	4.9	36.3	6.3	10.2	2.0	43.2
Operational and worker safety	3.3	38.7	5.9	9.1	0.8	43.3
Environmental	4.4	38.7	5.5	7.8	1.7	44.0
Intellectual property	3.8	39.3	9.1	5.7	0.5	43.1
Tax	0.9	40.7	7.4	5.9	1.2	45.0
Employment or social affairs	1.5	38.1	5.6	6.3	0.8	48.1
Data protection	2.7	41.1	9.8	8.2	0.9	39.2
Other	1.7	38.0	6.5	5.5	1.8	48.3
50–249 employees						
Product safety / consumer protection	9.4	35.6	6.9	11.8	2.3	38.3
Operational and worker safety	7.7	46.5	3.3	8.6	1.4	34.3
Environmental	10.2	37.9	5.8	8.7	1.9	39.2
Intellectual property	3.8	45.8	9.2	3.9	0.4	38.6
Tax	1.0	43.4	7.2	4.4	1.4	44.7
Employment or social affairs	1.9	44.1	4.7	4.9	1.2	44.5
Data protection	4.4	42.6	13.8	8.5	1.1	32.5
Other	2.8	42.3	6.6	6.7	1.9	41.5
250– employees						
Product safety / consumer protection	16.2	39.8	10.7	12.7	6.8	25.9
Operational and worker safety	12.1	54.9	4.6	3.9	0.7	25.5
Environmental	23.5	39.6	9.9	8.2	3.1	24.9
Intellectual property	11.2	45.1	11.5	8.7	2.1	28.5
Tax	2.0	49.6	5.5	6.3	2.2	36.0
Employment or social affairs	2.0	55.5	2.5	4.1	1.4	36.9
Data protection	11.1	40.3	17.2	14.1	2.2	21.9
Other	6.5	43.9	8.1	6.8	5.3	35.1

7. Enterprises’ strategies and innovation activity

In the survey, one background question inquired how important certain strategies were for the enterprise's activity in 2014 to 2016.

For example, 89 per cent of enterprises replied that improving existing goods and services had high or medium importance as a strategy. Of those having assessed this, 46 per cent introduced product innovations to the markets in 2014 to 2016, and 43 per cent reported process innovations. In all, 68 per cent reported innovation activity.

The share of enterprises with innovation activity among those responding that improvement of products was a highly important strategy, instead of high or medium, was even higher. The share of enterprises having brought product innovations to the market was 53 per cent and three out of four enterprises reported innovation activity.

For enterprises that said introducing new products had been the strategy, reporting innovations was even more common than above. If introducing new products had high importance as a strategy, the share of those having reported product innovations was 72 per cent, and 86 per cent had had innovation activity.

In practice, enterprises that focused on the said targets in their strategy also reported innovations more often. Enterprises that recorded the said strategies as non-relevant did not have much innovation activity.

Table 2. Enterprises’ strategies by importance of strategy 2014–2016, share of enterprises

	Importance of strategy high or medium	Importance of strategy high	Importance of strategy medium	Importance of strategy low
	%	%	%	%
Improving existing goods and services	89.4	50.8	38.6	6.1
Offering entirely new goods and services	69.0	28.5	40.5	22.3
Reaching new customer groups	77.6	39.9	37.7	15.0
Customer-specific solutions	81.7	43.5	38.2	12.3
Low prices	54.7	11.3	43.4	34.6

Table 3. Prevalence of innovation activity among those that assessed the said strategies as important in 2014 to 2016, share of enterprises having assessed the strategies as having high or medium importance

	Product innovations	Process innovations	Innovation activity related to products and processes	Innovation activity
	% of enterprises that assessed strategy as having high or medium importance	% of enterprises that assessed strategy as having high or medium importance	% of enterprises that assessed strategy as having high or medium importance	% of enterprises that assessed strategy as having high or medium importance
Improving existing goods and services	46,2	43,4	61,5	68,2
Offering entirely new goods and services	55,2	47,6	68,7	75,1
Reaching new customer groups	48,3	44,6	63,3	69,9
Customer-specific solutions	45,4	43,3	60,8	68,0
Low prices	40,1	39,5	56,1	63,9

8. Big data and open data in the public sector in enterprises' business activity

Here, big data or mass data refer to extremely large data sets that accumulate rapidly and that are in various formats. Big data are generated from electronic activities and machine-to-machine communications, and devices and applications require huge storage capacity and performance to be able to handle mass data.

Public sector open data refer to data produced or accumulated by authorities in public administration that are publicly available and can be reused by anyone free of charge, legitimately and in machine readable format.

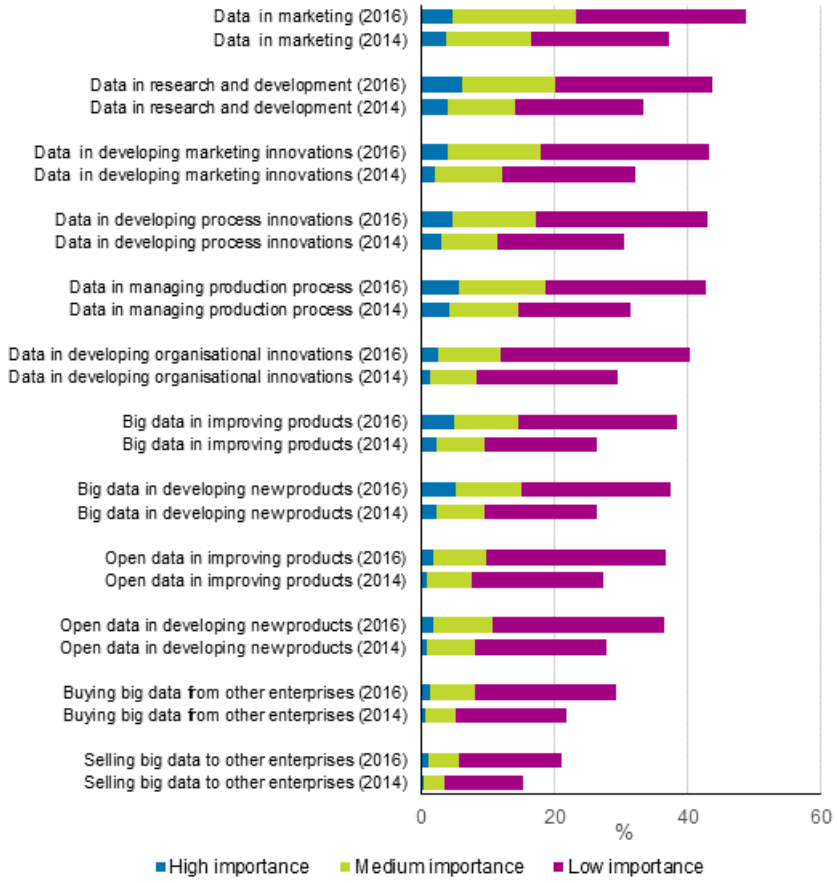
Questions were asked about the utilisation of big data and public sector open data in enterprises' business activity for the first time in connection with the previous survey, concerning the years 2012 to 2014.

As before, use of data in marketing was seen as most important among the mentioned data uses in 2014 to 2016. Nearly every fourth enterprise mentioned use of data in marketing as having either high or medium importance. Every fifth enterprise assessed the importance of data in research and development as high or medium, and nearly as many recorded the role of data as important in developing process and market innovations, as well as in managing the production process. The importance of big data in developing and improving products has risen slightly, while the importance of public sector open data is still more modest. Buying and selling of big data between enterprises was still a significant business activity for only a few enterprises in 2014 to 2016.

Although the utilisation of big data and open data has an important role for a limited group of enterprises and for most the importance is low or the data are not at all in use, the share of those assessing the use of data relevant for their enterprise has, however, now risen slightly for all uses of data compared with the previous survey.

Every seventh enterprise has estimated that at least one of the mentioned uses of data has high importance, and for every fourth enterprise at most medium important uses were found from the alternatives for data use. Around every fifth assessed that data had only low importance for the enterprise's business activity, and 42 per cent of enterprises said that the mentioned uses of data do not concern at all the business activity of their enterprise. In the previous survey, the share of those enterprises that assessed that matters related to data use did not concern their enterprise was 52 per cent, which means that use of data has become part of the activity for an ever larger group of enterprises, even though its importance is not that high yet.

Figure 21. Importance of big data and public sector open data in enterprises' business activity in 2012 to 2014 (in the figure 2014) and in 2014 to 2016 (in the figure 2016), share of enterprises



The use of data and its utilisation in business activity naturally vary by the nature of the activity and industry. Apart from the use of data in managing the production process, service enterprises assessed uses of data as more important than manufacturing enterprises, although manufacturing enterprises mentioned the use of data relatively more often than enterprises in service industries. Data by industry can be found in the database tables on the home page of the statistics
http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin__ttt__inn/

In manufacturing, uses of data with high importance were the use of data in managing the production processes, the use of data in research and development activities and the utilisation of data in developing process innovations, as well as in marketing. In services, enterprises mentioned as important the use of data in marketing and developing market innovations, but also the use of big data in both improving products and developing new products. As in manufacturing, service enterprises also considered the utilisation of data important in research and development activities and in process management.

Figure 22. Importance of big data and public sector open data in enterprises' business activity in manufacturing in 2014 to 2016, share of enterprises

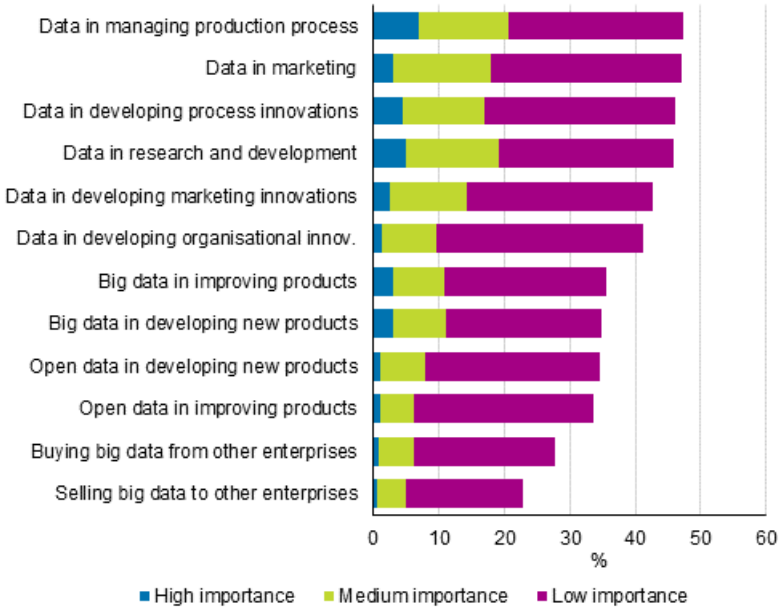
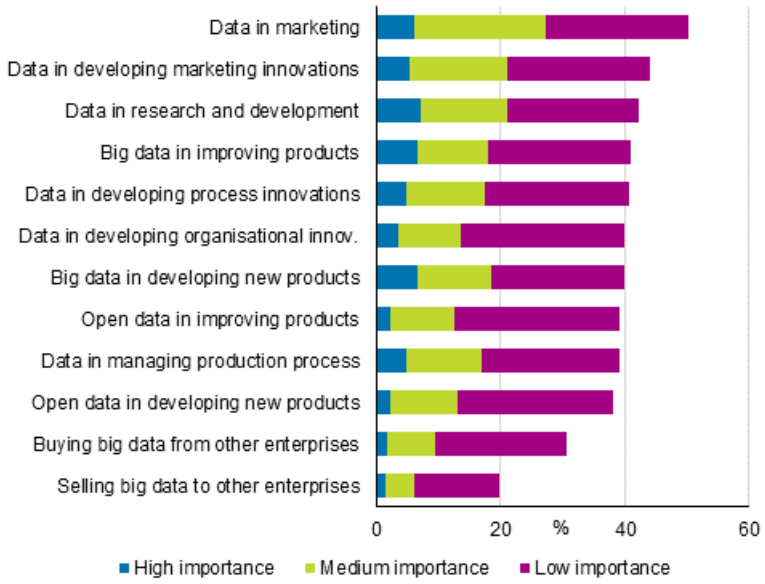


Figure 23. Importance of big data and public sector open data in enterprises' business activity in services in 2014 to 2016, share of enterprises



9. Digitalisation in enterprises' business activity

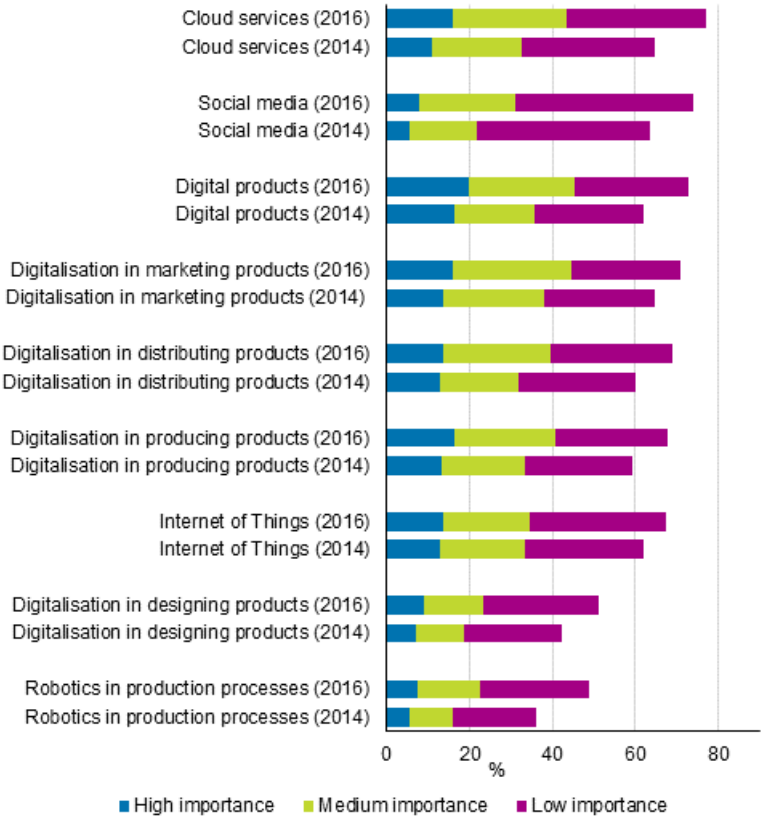
Digitalisation refers to transferring goods, services and their production or distribution to electronic format and, similarly as the question on big data, the importance of digitalisation in enterprises' business activity was inquired for the second time in connection with the Innovation Survey.

Forty-one per cent of enterprises estimated that at least one thing related to digitalisation had high importance in 2014 to 2016. Every third enterprise felt that issues of digitalisation had at least medium importance. In all, 13 per cent of enterprises estimated that the alternatives given had at most low importance and good every tenth saw that the mentioned digitalisation factors did not concern their enterprise at all.

Compared with the previous survey, enterprises rated digitalisation now relatively more often and also assessed its importance as higher.

Digital products are the core of digitalisation. Every fifth enterprise assessed their importance as high in their business activity. Cloud services are mentioned generally, and they are important examined by importance as well. In turn, social media, which is also commonly mentioned, has a significant role for a smaller group of enterprises.

Figure 24. Importance of digitalisation in enterprises' business activity in 2012 to 2014 (in the figure 2014) and in 2014 to 2016 (in the figure 2016), share of enterprises



For enterprises in services industries many items of digitalisation in the survey appear to be more commonly important than in manufacturing enterprises. Only robotics was clearly more important in manufacturing than in services.

For example, cloud services, digitalisation of production and digitalisation of marketing and distribution were assessed by nearly one-half of enterprises in services as having at least medium importance for the enterprise's business activity. In manufacturing, the share is around one-third of enterprises, for cloud services slightly more and for distribution slightly less. Data by industry can be found in the database tables on the home page of the statistics http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin__ttt__inn

Figure 25. Importance of digitalisation in enterprises' business activities in manufacturing in 2014 to 2016, share of enterprises

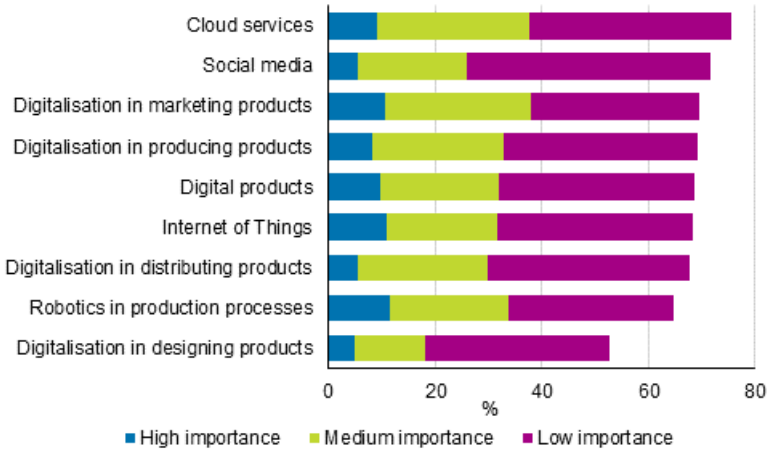
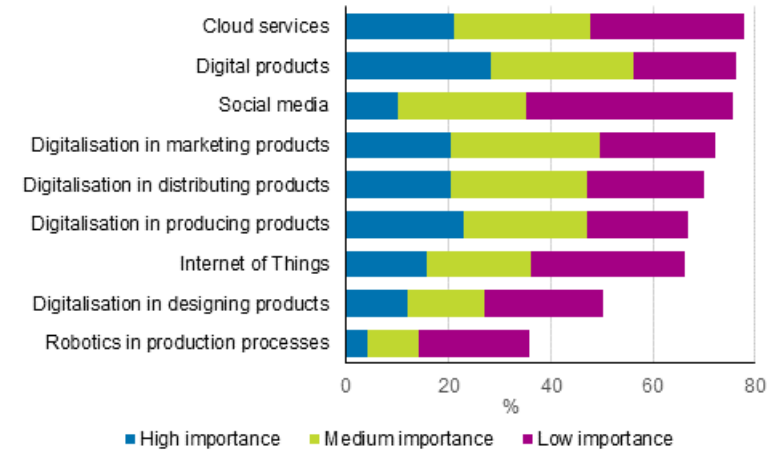


Figure 26. Importance of digitalisation in enterprises' business activities in services in 2014 to 2016, share of enterprises



10. Cooperation between enterprises and universities and working together

In connection with the Innovation Survey, enterprises were inquired now for the first time more extensively about cooperation with universities. Cooperation between enterprises and universities here means organised, active cooperation, as well as other transfer of know-how, collaboration and goal-oriented interaction or communication. Cooperation covers both innovation cooperation and other cooperation with both domestic and foreign universities suitable for the definition.

Around one-fifth of enterprises reported cooperation with universities in 2014 to 2016. In total, 13 per cent reported innovation cooperation with universities. Similarly, 13 per cent reported other than innovation cooperation.

About seven per cent of enterprises reported only innovation cooperation with universities, not any other type of cooperation as meant in the inquiry, in 2014 to 2016. Similarly, seven per cent had done both innovation cooperation and other cooperation. In relative terms, an equally large group of enterprises – six per cent of the target group – had done only other than innovation cooperation.

Cooperation became more common as the enterprise size grew and in manufacturing, the share of those having reported cooperation was larger than in services.

Nearly all having reported cooperation worked together with domestic universities, and nearly four per cent said they had cooperated with foreign universities.

Table 4. Collaboration with universities 2014–2016, share of enterprises

		Collaboration	Cooperation with domestic universities	Cooperation with foreign universities
		%	%	%
All NACE -Total (number of enterprises 8491)	Innovation cooperation	13.5	13.0	2.9
	Other cooperation	12.6	12.1	1.5
Manufacturing (number of enterprises 3747)	Innovation cooperation	18.5	18.1	4.1
	Other cooperation	14.8	14.3	2.3
Services (number of enterprises 4744)	Innovation cooperation	9.5	9.1	2.0
	Other cooperation	11.0	10.4	0.9

Table 5. Collaboration with universities 2014–2016, share of all enterprises

All enterprises (Number of enterprises 8491)		Share of enterprises with cooperation	Cooperation only with domestic universities	Cooperation both with domestic and foreign universities	Cooperation only with foreign universities
		%	%	%	%
Share of enterprises with cooperation	%	19.2			
Only innovation cooperation	%		5.2	1.1	0.2
Both innovation cooperation and other cooperation	%		4.9	1.8	0.1
Only other cooperation	%		5.5	0.1	0.2

Table 6. Collaboration with universities in manufacturing 2014–2016, share of all enterprises

Manufacturing (Number of enterprises 3747)		**Share of enterprises with cooperation**	**Cooperation only with domestic universities**	**Cooperation both with domestic and foreign universities**	**Cooperation only with foreign universities**
		%	%	%	%
Share of enterprises with cooperation	%	24.2			
Only innovation cooperation	%		7.6	1.6	0.2
Both innovation cooperation and other cooperation	%		6.4	2.6	0.1
Only other cooperation	%		5.0	0.2	0.4

Table 7. Collaboration with universities in services 2014–2016, share of all enterprises

Services (Number of enterprises 4744)		**Share of enterprises with cooperation**	**Cooperation only with domestic universities**	**Cooperation both with domestic and foreign universities**	**Cooperation only with foreign universities**
		%	%	%	%
Share of enterprises with cooperation	%	15.3			
Only innovation cooperation	%		3.3	0.8	0.3
Both innovation cooperation and other cooperation	%		3.7	1.2	0.1
Only other cooperation	%		5.8	0.0	0.0

The share of those having had university cooperation in manufacturing was 24 per cent in 2014 to 2016. Nearly all of them reported cooperation with domestic universities, and five per cent of enterprises, that is, around every fifth of those having collaborated, had cooperated with foreign universities. In service industries, the share of enterprises having had university cooperation was 15 per cent of all surveyed enterprises. Similarly as in manufacturing, nearly all of them had had cooperation with domestic universities. In turn, a couple of per cent reported cooperation with foreign universities.

Nearly one-fifth of manufacturing enterprises reported innovation cooperation in this connection, and good ten per cent other cooperation. The respective proportions in services were around 10 and 11 per cent.

The examination by industry shows that in manufacturing the industries that had university cooperation most commonly were the manufacture of computer, electronic and optical products, the manufacture of chemicals and chemical products, and the manufacture of paper and paper products. In the first two mentioned ones, as in the manufacture of basic metals, mining and quarrying, and the manufacture of furniture, the share of those having cooperated with foreign universities was one of the highest in the data.

In services, in turn, enterprises in research and development and computer programming most often collaborated with universities, of whom one-quarter also with foreign universities.

Figure 27. Those having had university cooperation in manufacturing in 2014 to 2016, share of all

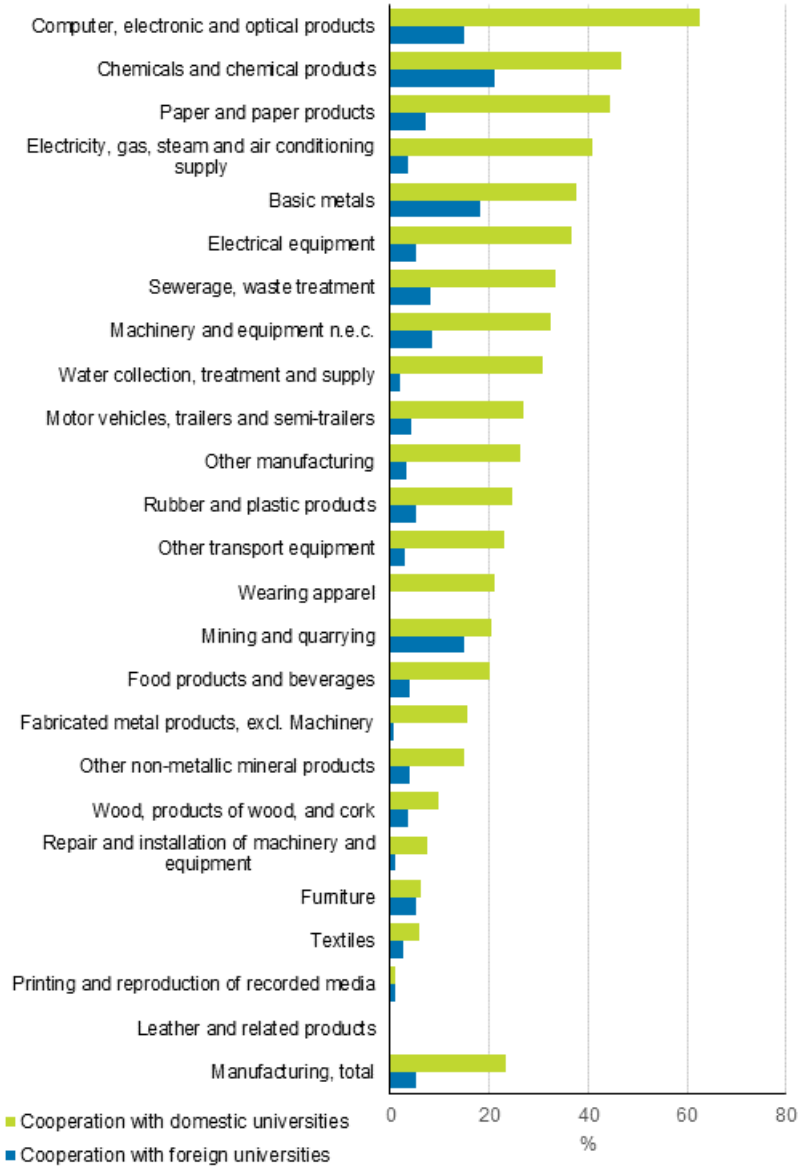
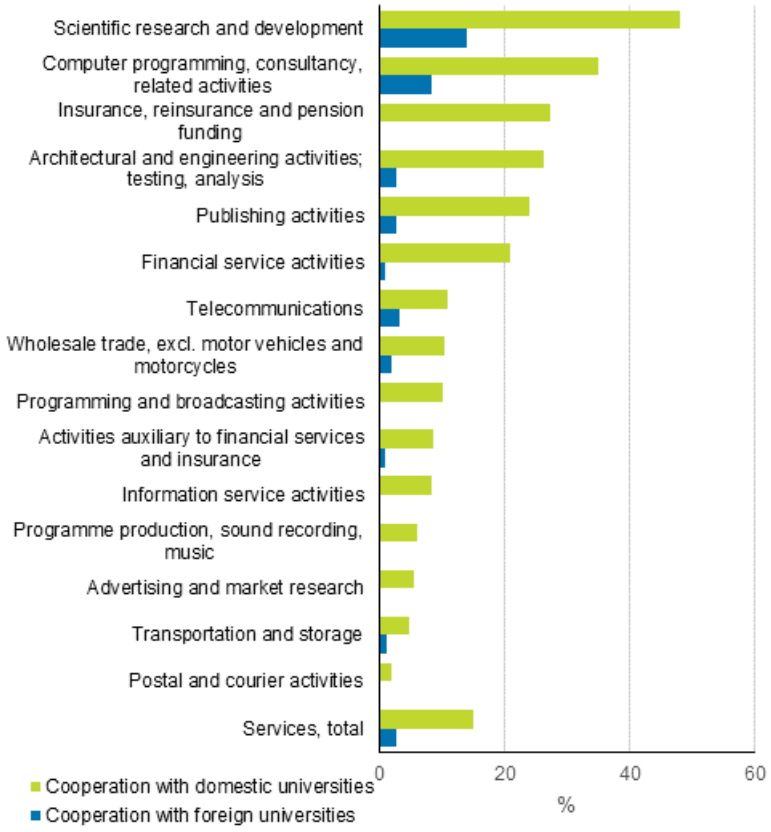


Figure 28. Those having had university cooperation in services in 2014 to 2016, share of all



In many fields, a considerable share of those having cooperated had had both innovation cooperation and other cooperation with universities. For example, three out of four having cooperated in computers, electronic and optical equipment had had innovation cooperation, while over one half had had other than innovation cooperation. In services, in computer programming, for example, around one third did only innovation cooperation, another third both innovation and other cooperation and the remaining third only other than innovation cooperation. More detailed data by industry can be found in the database tables on the home page of the statistics
http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin__ttt__inn/?rxid=bc3e89c0-f7db-4a3d-99a8-8fb9999226de

Figure 29. Innovation cooperation and other university cooperation in manufacturing in 2014 to 2016, share of all

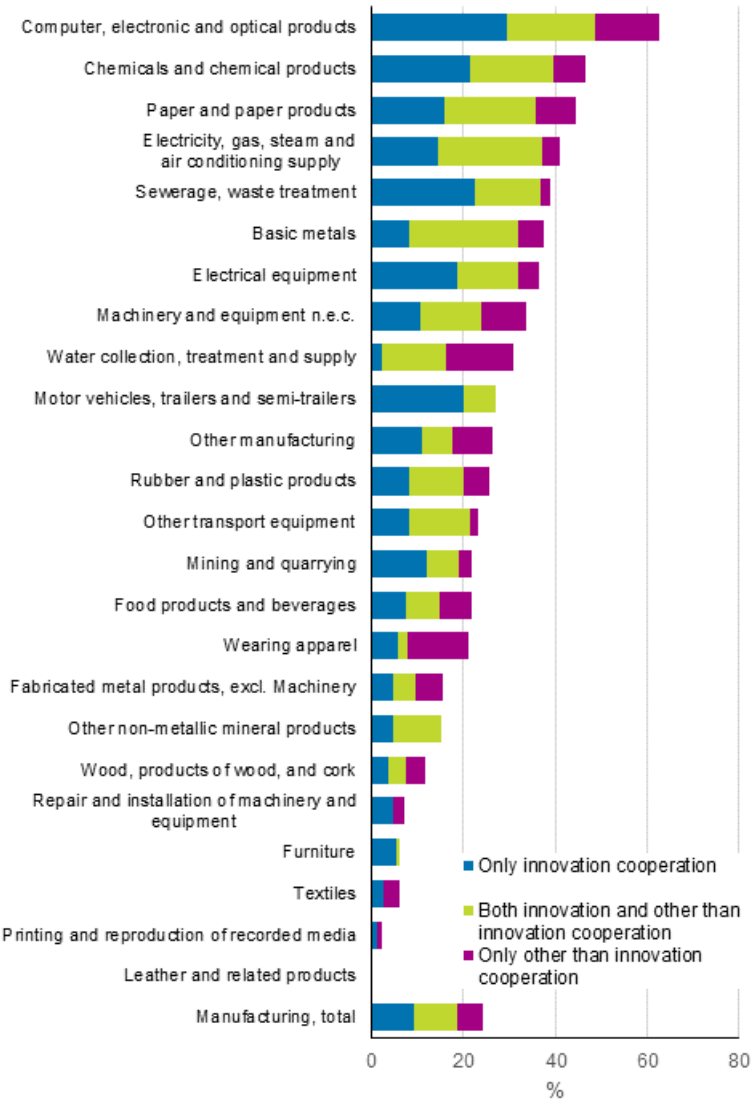
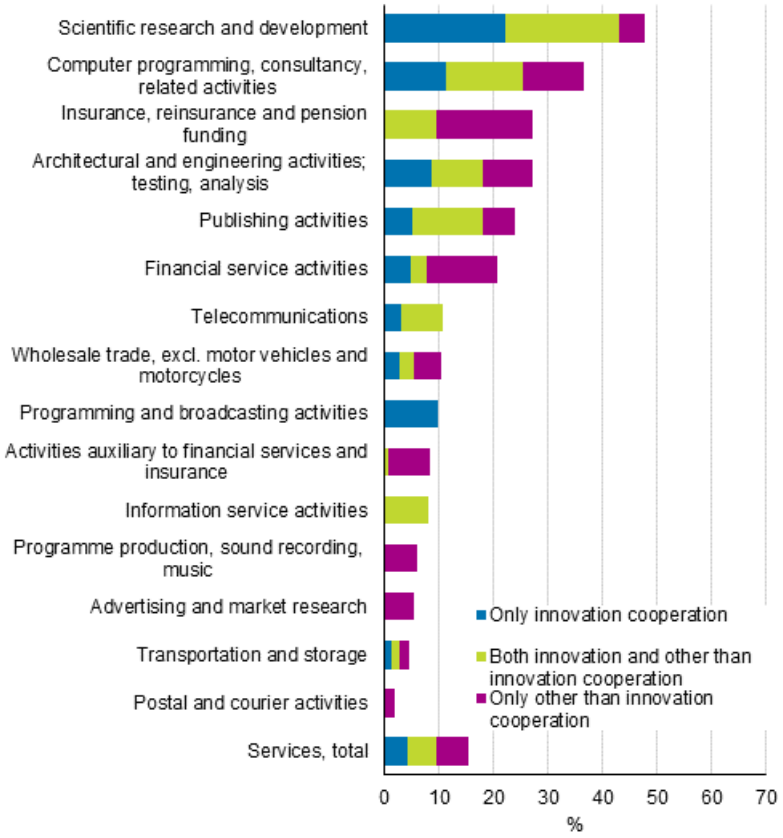


Figure 30. Innovation cooperation and other university cooperation in manufacturing in 2014 to 2016, share of all

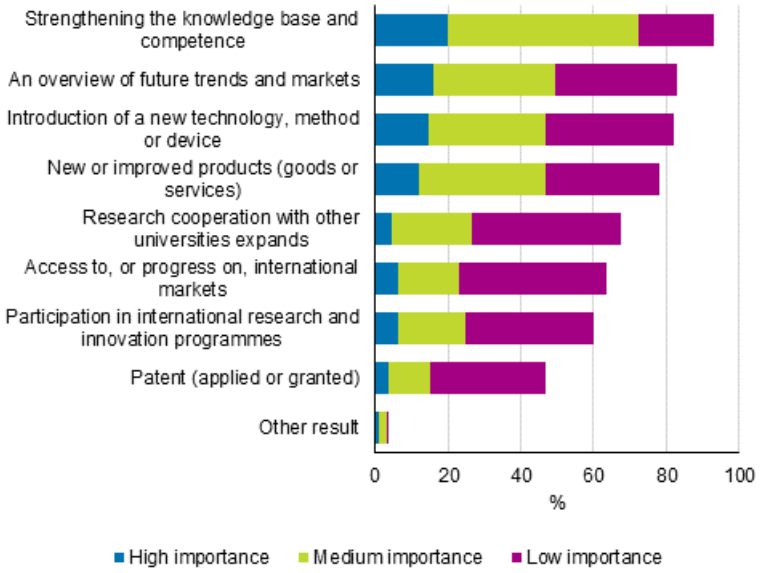


Of the results of university cooperation, enterprises thought most important were strengthening the knowledge base and competence, overview of future trends and markets, introduction of new technologies, methods or devices and developing new and improved products.

Three out of four of those having cooperated assessed strengthening the knowledge basis and competence as important (importance high or medium) and nearly one-half of them estimated understanding of future trends, introduction of new technologies and development of new products as the important results of cooperation with universities. Around one-quarter of those having had cooperation regarded internationalisation and international activity – access to international markets or its promotion and participation in international research and innovation programmes – as important.

In views and expectations related to the results, university cooperation appears relatively similar in services and manufacturing. Enterprises in service industries, however, estimated views and outlooks related to future trends and markets were more important than manufacturing enterprises, as well as access to international markets and its promotion. Introduction of new technology is, in turn, focused on manufacturing.

Figure 31. Realised or expected results of university cooperation by importance by the end of 2018, share of those that had cooperated in 2014 to 2016

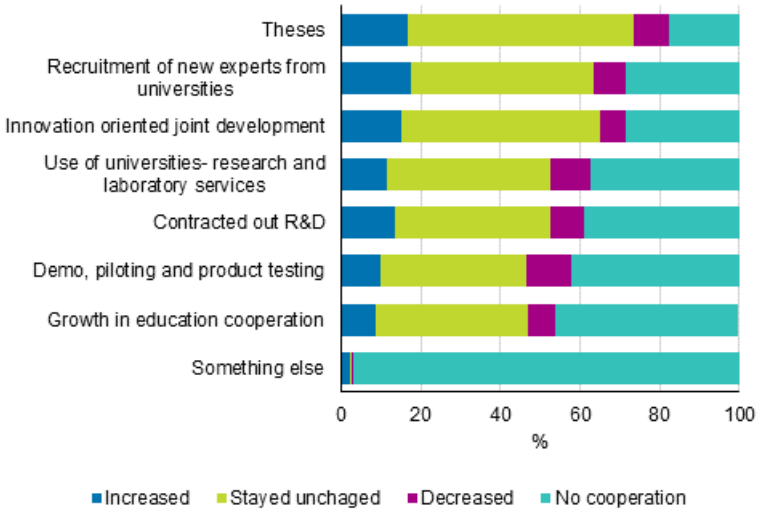


The majority of those having had various types of cooperation with universities feels the collaboration and its forms to have remained similar to before in 2014 to 2016. Most growth concerned recruitment of new experts from universities, cooperation made through graduation theses, innovation-oriented joint development and contracted out R&D.

However, the development of cooperation and changes felt there differ somewhat in the responses of manufacturing enterprises and service enterprises. Every fourth service enterprise having had university cooperation estimated that recruitment of new experts from universities had increased and its importance had grown from before. The share in manufacturing was some 10 per cent. Contracted out R&D was again a more relevant form of cooperation for manufacturing enterprises, 15 per cent of which reported collaboration had grown along with them in 2014 to 2016 compared with earlier. Nearly one-half estimated the situation of contracted out research had remained unchanged. In services, over one-half, 54 per cent considered contracted out R&D a non-relevant cooperation form. The situation is similar in the use of universities' research and laboratory infrastructure and services; they are relevant and have increased in importance more in manufacturing enterprises than in service enterprises.

The growing significance of university cooperation is visible in enterprises of all sizes. Of the smallest cooperators, 13 per cent refer to growth in the importance of contracted out research, 15 per cent of medium-sized ones and 12 per cent of large ones. The importance of universities' research and laboratory infrastructure and services has grown for 11 per cent of the smallest enterprises, similarly for 11 per cent of medium-sized enterprises and for 15 per cent of the largest enterprises. Large enterprises have noted more often than small ones that the importance of recruitment from universities and joint development of innovations have grown. The smallest enterprises in the data, in turn, noticed growth in the importance of theses, in particular.

Figure 32. Development of forms and importance of university cooperation compared to before in 2014 to 2016, share of those having cooperated with universities



Every fourth enterprise intended to cooperate with universities in 2017 to 2018. As realised cooperation, intentions become more common as the enterprise size grows.

Nearly all that had planned cooperation were going to cooperate with Finnish universities. Six per cent of enterprises were going to work together with foreign universities.

In manufacturing, almost every third enterprise had cooperation intentions. For example, nearly one-half of the biggest manufacturing enterprises in the data intended to cooperate with both Finnish and foreign universities. In service industries, every fifth enterprise was planning cooperation, nearly one-half of large enterprises.

Appendix tables

Appendix table 1. Prevalence of innovation activity by size category of personnel, 2014–2016, share of enterprises

Industry	Size category of personnel	Number of enter-prises	Product innova-tions (goods and services)	Process innova-tions	Innovation projects	Innovation activity	Organi-sational innova-tions	Marke-ting innova-tions	Innovation activity, broadly defined
			%	%	%	%	%	%	%
All NACE -Total	10-49	6532	39.1	37.4	30.0	54.3	33.0	28.4	60.5
	50-249	1607	51.9	50.8	48.7	69.3	52.9	42.3	77.8
	250-	352	69.3	62.9	65.7	80.9	63.8	54.5	84.9
	Total	**8491**	**42.7**	**41.0**	**35.0**	**58.2**	**38.0**	**32.1**	**64.8**
Manu-facturing	10-49	2717	38.7	42.6	33.7	59.5	33.5	26.6	65.1
	50-249	840	55.2	55.7	56.8	75.8	53.9	41.6	81.4
	250-	190	81.7	75.2	82.4	90.9	77.2	65.9	93.0
	Total	**3747**	**44.6**	**47.2**	**41.3**	**64.7**	**40.3**	**32.0**	**70.1**
Services	10-49	3815	39.3	33.8	27.4	50.6	32.5	29.6	57.2
	50-249	767	48.2	45.5	39.7	62.3	51.9	43.0	74.0
	250-	162	54.8	48.4	46.1	69.1	48.2	41.2	75.5
	Total	**4744**	**41.3**	**36.2**	**30.0**	**53.1**	**36.2**	**32.2**	**60.5**

Appendix table 2. Prevalence of innovation activity by industry, 2014–2016, share of enterprises

Industry	Number of enterprises	Product innovations (goods and services)	Process innovations	Innovation projects	Innovation activity relating to products and processes	Organisational innovations	Marketing innovations	Innovation activity, broadly defined
		%	%	%	%	%	%	%
05-09 Mining and quarrying	72	13.2	31.6	23.3	41.0	24.0	9.7	49.1
10-12 Food products and beverages	363	58.5	51.3	39.7	71.9	42.2	43.3	76.1
13 Textiles	39	24.8	20.0	5.1	39.7	8.5	10.7	47.8
14 Wearing apparel	39	48.4	19.1	34.4	54.2	42.2	46.7	60.0
15 Leather and related products	16	57.5	27.5	15.0	57.5	15.0	45.0	57.5
16 Wood, products of wood, and cork	248	33.2	45.2	32.9	52.3	43.3	32.3	59.7
17 Paper and paper products	73	57.3	68.5	54.5	78.7	57.4	47.3	84.4
18 Printing and reproduction of recorded media	124	27.1	40.3	27.4	51.2	22.5	21.7	54.3
19-21 Chemicals and chemical products	124	57.7	47.1	66.6	77.8	42.8	30.6	77.8
22 Rubber and plastic products	176	51.4	56.0	42.9	70.9	49.9	33.9	80.2
23 Other non-metallic mineral products	134	32.5	63.7	32.5	67.6	42.0	30.5	73.8
24 Basic metals	49	31.5	40.1	37.6	62.9	33.0	25.4	68.5
25 Fabricated metal products, except machinery and equipment	750	28.0	45.2	33.4	57.3	30.0	20.9	60.1
26 Computer, electronic and optical products	139	78.3	53.2	76.1	89.2	58.5	43.3	92.4
27 Electrical equipment	148	65.4	61.4	60.9	78.4	55.2	41.3	87.8
28 Machinery and equipment n.e.c.	411	74.6	54.7	56.8	84.0	52.8	43.9	85.7
29 Motor vehicles, trailers and semi-trailers	71	32.6	44.9	47.6	65.9	63.2	25.9	85.8
30 Other transport equipment	56	65.1	51.4	53.9	74.5	47.3	44.3	79.8
31 Furniture	120	44.7	51.7	46.5	64.0	34.2	44.7	79.8
32 Other manufacturing	69	63.4	54.8	52.2	88.9	34.7	54.6	88.9
33 Repair and installation of machinery and equipment	200	28.2	24.0	14.1	36.5	31.4	11.9	42.4
35 Electricity, gas, steam and air conditioning supply	158	36.6	41.1	40.6	62.5	49.2	35.7	69.7
36 Water collection, treatment and supply	48	2.1	26.0	18.8	26.0	11.6	2.1	28.4
37-39 Sewerage, waste treatment	119	30.9	41.1	48.1	57.7	33.4	31.7	71.2
46 Wholesale trade, except of motor vehicles and motorcycles	1244	46.4	36.0	28.7	57.0	35.5	41.5	68.9
49-52 Transportation and storage	1313	20.2	24.8	13.4	33.3	19.7	12.9	38.7
53 Postal and courier activities	52	19.2	32.6	14.6	32.6	9.1	14.6	32.6
58 Publishing activities	149	38.0	37.3	34.1	50.2	38.0	33.3	53.3
59 Programme production, sound recording and music publishing activities	64	38.7	33.6	37.2	50.8	15.6	21.6	56.8
60 Programming and broadcasting activities	15	10.0	10.0	0.0	10.0	10.0	10.0	10.0

Industry	Number of enter-prises	Product innova-tions (goods and services)	Process innova-tions	Innovation projects	Innovation activity relating to products and processes	Organi-sational innova-tions	Marke-ting innova-tions	Innovation activity, broadly defined
		%	%	%	%	%	%	%
61 Telecommunications	63	55.7	50.9	61.2	72.3	61.6	54.1	75.5
62 Computer programming, consultancy and related activities	584	76.3	58.1	61.9	85.1	63.7	63.0	88.7
63 Information service activities	57	61.6	35.7	49.7	71.6	59.6	40.1	71.6
64 Financial service activities	229	39.4	40.1	28.2	55.6	41.3	32.0	63.0
65 Insurance, reinsurance and pension funding	48	62.8	51.0	40.4	66.5	64.2	47.3	73.8
66 Activities auxiliary to financial services and insurance activities	107	30.8	23.4	15.9	45.8	35.5	29.9	60.7
71 Architectural and engineering activities; technical testing and analysis	578	42.7	40.9	36.2	55.4	41.4	27.0	61.9
72 Scientific research and development	67	42.8	47.6	52.8	72.1	42.8	29.4	72.1
73 Advertising and market research	175	45.1	25.8	20.9	51.6	39.6	23.6	65.9
All NACE - Total	**8491**	**42.7**	**41.0**	**35.0**	**58.2**	**38.0**	**32.1**	**64.8**
05-39 Manufacturing, total	**3747**	**44.6**	**47.2**	**41.3**	**64.7**	**40.3**	**32.0**	**70.1**
46, 49-53, 58-66, 71-73 Services, total	**4744**	**41.3**	**36.2**	**30.0**	**53.1**	**36.2**	**32.2**	**60.5**

Appendix table 3. Prevalence of innovation activity relating to products or processes by enterprise's geographic markets 2014-2016, share of enterprises

Industry	Selling of products	Number of enter-prises	Product innova-tions (goods and services)	Process innova-tions	Product or process innovations	Innovation projects	Innovation activity	All elements
			%	%	%	%	%	%
All NACE - Total	In Finland only	4426	29.8	32.4	43.6	22.0	46.1	11.8
	In other European Union or associated countries, not outside	1451	50.1	44.0	61.8	38.4	66.1	22.5
	Outside European Union or associated countries	2614	60.6	54.0	71.1	55.3	74.5	36.7
Manu-facturing	In Finland only	1540	25.9	38.5	46.4	25.5	50.4	12.3
	In other European Union or associated countries, not outside	611	45.8	45.8	61.3	40.0	66.9	20.4
	Outside European Union or associated countries	1596	62.1	56.1	74.9	57.1	77.7	36.4
Services	In Finland only	2886	31.8	29.1	42.1	20.1	43.8	11.5
	In other European Union or associated countries, not outside	839	53.2	42.8	62.1	37.2	65.5	23.9
	Outside European Union or associated countries	1019	58.4	50.6	65.1	52.4	69.4	37.3

Appendix table 4. Prevalence of marketing and organisational innovations by enterprise's geographic markets 2014-2016, share of enterprises

Industry	Selling of products	Number of enter-prises	Organi-sational innova-tions	Marke-ting innova-tions	Marketing or organi-sational innovations	Product, process, marketing or organisational innovations	Innovation activity, broadly defined	All elements
			%	%	%	%	%	%
ALL NACE - Total	In Finland only	4426	29.3	23.2	35.6	50.9	52.7	7.8
	In other European Union or associated countries, not outside	1451	43.9	36.8	52.4	71.0	74.1	15.0
	Outside European Union or associated countries	2614	49.5	44.5	59.5	78.0	80.0	22.7
Manu-facturing	In Finland only	1540	30.5	21.5	36.2	54.8	57.3	7.4
	In other European Union or associated countries, not outside	611	44.0	31.6	50.7	67.7	72.7	12.5
	Outside European Union or associated countries	1596	48.3	42.3	59.8	80.0	81.6	19.6
Services	In Finland only	2886	28.6	24.2	35.3	48.8	50.2	8.0
	In other European Union or associated countries, not outside	839	43.9	40.5	53.7	73.4	75.1	16.8
	Outside European Union or associated countries	1019	51.4	48.0	59.2	74.8	77.6	27.4

Appendix table 5. Developers of goods innovations by size category of personnel, 2014–2016, share of enterprises with goods innovations

Industry	Size category of personnel	Number of enterprises	Own enterprise by itself	Own enterprise together with others	Own enterprise by adapting or modifying goods developed by others	Other enterprises or institutions
			%	%	%	%
ALL NACE - Total	10-49	1655	75.4	52.4	31.9	17.3
	50-249	593	73.5	57.3	27.5	14.6
	250-	175	88.9	74.4	27.9	25.6
	Total	**2422**	**75.9**	**55.2**	**30.5**	**17.2**
Manufacturing	10-49	905	81.3	55.2	29.3	12.8
	50-249	412	77.7	57.3	28.3	10.5
	250-	143	92.0	77.1	25.9	23.2
	Total	**1460**	**81.4**	**57.9**	**28.7**	**13.2**
Services	10-49	750	68.3	49.0	35.1	22.7
	50-249	181	63.8	57.3	25.7	24.1
	250-	31	74.6	61.9	37.3	36.7
	Total	**962**	**67.6**	**51.0**	**33.4**	**23.4**

Appendix table 6. Developers of goods innovations by industry, 2014–2016, share of enterprises with goods innovations

Industry	Number of enter-prises	Own enterprise by itself	Own enterprise together with others	Own enter-prise by adapting or modifying goods developed by others	Other enter-prises or insti-tutions
		%	%	%	%
05-09 Mining and quarrying	8	100.0	40.0	13.3	13.3
10-12 Food products and beverages	205	92.3	54.1	30.2	14.0
13 Textiles	10	86.3	24.1	32.8	24.1
14 Wearing apparel	13	88.1	0.0	11.9	0.0
15 Leather and related products	7	70.6	35.3	64.7	0.0
16 Wood, products of wood, and cork	76	77.7	43.1	45.0	8.0
17 Paper and paper products	39	78.6	48.7	24.4	5.4
18 Printing and reproduction of recorded media	24	72.2	72.2	77.8	27.8
19-21 Chemicals and chemical products	72	83.2	60.7	33.5	25.5
22 Rubber and plastic products	80	74.4	65.4	15.3	9.6
23 Other non-metallic mineral products	44	75.8	75.8	19.5	5.2
24 Basic metals	14	100.0	65.5	7.3	7.3
25 Fabricated metal products, excl. machinery, equip.	160	75.9	62.2	32.1	8.0
26 Computer, electronic and optical products	100	70.7	74.1	23.6	13.1
27 Electrical equipment	92	82.0	61.9	31.4	18.3
28 Machinery and equipment n.e.c.	299	88.9	55.6	21.6	9.9
29 Motor vehicles, trailers and semi-trailers	19	70.7	64.8	32.2	6.8
30 Other transport equipment	36	82.9	58.0	37.3	13.6
31 Furniture	54	60.7	35.3	39.3	15.8
32 Other manufacturing	44	81.2	50.2	13.8	5.0
33 Repair and installation of machinery and equipment	30	68.9	62.1	44.8	44.8
35 Electricity, gas, steam and air conditioning supply	18	57.3	80.9	16.8	27.0
37-39 Sewerage, waste treatment	19	94.7	85.8	35.0	45.6
46 Wholesale trade, excl. motor vehicles, motorcycles	487	59.2	52.1	28.4	30.8
49-52 Transportation and storage	37	58.1	74.5	72.8	31.6
53 Postal and courier activities	..	..	..	..	..
58 Publishing activities	32	85.3	55.6	26.2	33.7
59 Programme production, sound recording, music publ.	14	100.0	100.0	72.1	16.3
60 Programming and broadcasting activities	..	..	..	..	..
61 Telecommunications	16	76.6	76.6	29.7	29.7
62 Computer programming, consultancy, related activities	226	79.1	40.9	42.5	12.3
63 Information service activities	..	..	..	..	..
64 Financial service activities	19	0.0	73.7	11.8	26.3
65 Insurance, reinsurance and pension funding	..	..	..	..	..
66 Activities auxiliary to financial services and insurance	7	100.0	14.3	14.3	14.3
71 Architectural and engineering activities; testing, analysis	96	79.7	53.4	27.0	10.9
72 Scientific research and development	9	100.0	27.1	62.1	10.8
73 Advertising and market research	14	100.0	0.0	0.0	0.0
All NACE - Total	**2422**	**75.9**	**55.2**	**30.5**	**17.2**
05-39 Manufacturing, total	**1460**	**81.4**	**57.9**	**28.7**	**13.2**
46, 49-53, 58-66, 71-73 Services, total	**962**	**67.6**	**51.0**	**33.4**	**23.4**

Appendix table 7. Developers of service innovations by size category of personnel, 2014–2016, share of enterprises with service innovations

Industry	Size category of personnel	Number of enterprises	Own enterprise by itself	Own enterprise together with others	Own enterprise by adapting or modifying services developed by others	Other enterprises or institutions
			%	%	%	%
ALL NACE - Total	10-49	1741	78.1	52.2	37.8	19.3
	50-249	553	67.5	57.7	29.9	19.4
	250-	175	79.0	75.4	35.4	19.9
	Total	**2469**	**75.8**	**55.1**	**35.8**	**19.4**
Manufacturing	10-49	525	76.3	51.6	35.2	18.8
	50-249	225	62.7	60.5	30.6	23.5
	250-	91	82.7	72.6	33.4	16.4
	Total	**841**	**73.3**	**56.3**	**33.8**	**19.8**
Services	10-49	1216	78.9	52.4	38.9	19.6
	50-249	327	70.8	55.7	29.3	16.6
	250-	84	75.0	78.4	37.5	23.6
	Total	**1628**	**77.1**	**54.4**	**36.9**	**19.2**

Appendix table 8. Developers of service innovations by industry, 2014–2016, share of enterprises with service innovations

Industry	Number of enter-prises	Own enterprise by itself	Own enterprise together with others	Own enterprise by adapting or modifying services developed by others	Other enter-prises or institu-tions
		%	%	%	%
05-09 Mining and quarrying	7	84.6	30.8	15.4	15.4
10-12 Food products and beverages	76	61.2	47.2	32.2	34.6
13 Textiles	..	..	..	..	..
14 Wearing apparel	8	67.4	32.6	0.0	0.0
15 Leather and related products	..	..	..	..	..
16 Wood, products of wood, and cork	30	68.3	51.9	16.4	8.2
17 Paper and paper products	19	44.2	55.7	33.6	0.0
18 Printing and reproduction of recorded media	27	80.1	55.3	49.6	24.8
19-21 Chemicals and chemical products	28	76.8	57.8	30.0	30.0
22 Rubber and plastic products	31	73.4	66.7	46.7	6.6
23 Other non-metallic mineral products	21	64.1	80.1	5.3	10.6
24 Basic metals	7	84.6	15.4	0.0	0.0
25 Fabricated metal products, excl. machinery, equip.	131	68.3	51.5	41.5	13.2
26 Computer, electronic and optical products	63	92.8	56.3	33.1	8.2
27 Electrical equipment	34	52.6	63.1	60.1	6.0
28 Machinery and equipment n.e.c.	151	87.1	55.3	25.7	15.7
29 Motor vehicles, trailers and semi-trailers	8	39.4	23.2	60.6	0.0
30 Other transport equipment	13	60.1	52.5	47.1	47.1
31 Furniture	31	72.3	58.7	3.3	34.7
32 Other manufacturing	23	30.6	86.1	16.7	16.7
33 Repair and installation of machinery and equipment	47	91.2	49.1	44.2	55.3
35 Electricity, gas, steam and air conditioning supply	54	72.5	68.8	29.0	15.3
36 Water collection, treatment and supply	..	..	..	..	..
37-39 Sewerage, waste treatment	27	72.3	79.3	83.0	51.7
46 Wholesale trade, excl. motor vehicles, motorcycles	338	70.3	56.1	38.5	23.6
49-52 Transportation and storage	257	67.2	58.8	51.5	23.5
53 Postal and courier activities	10	52.4	100.0	0.0	0.0
58 Publishing activities	52	58.6	73.6	40.6	29.3
59 Programme production, sound recording, music publ.	25	86.9	84.4	71.3	9.1
60 Programming and broadcasting activities	..	..	..	..	..
61 Telecommunications	35	64.5	83.7	35.5	37.6
62 Computer programming, consultancy and related activities	410	91.7	43.7	32.9	14.0
63 Information service activities	33	93.5	62.1	0.0	0.0
64 Financial service activities	85	45.5	64.8	7.8	25.0
65 Insurance, reinsurance and pension funding	30	66.6	79.0	21.4	15.4
66 Activities auxiliary to financial services and insurance	33	75.8	45.5	54.5	9.1
71 Architectural and engineering activities; testing, analysis	224	88.9	46.9	40.3	14.5
72 Scientific research and development	23	85.9	67.4	39.2	18.5
73 Advertising and market research	71	75.7	43.4	28.4	25.7
All NACE - Total	**2469**	**75.8**	**55.1**	**35.8**	**19.4**
05-39 Manufacturing, total	**841**	**73.3**	**56.3**	**33.8**	**19.8**
46, 49-53, 58-66, 71-73 Services, total	**1628**	**77.1**	**54.4**	**36.9**	**19.2**

Appendix table 9. Proportion of product innovations and unchanged products of turnover by size category of personnel, 2016, proportions of the total turnover of all enterprises

Industry	Size category of employees	Products new to the market	Products new only to the enterprise	Unchanged products
		%	%	%
All NACE - Total	10-49	4.4	3.5	92.1
	50-249	5.5	2.5	92.1
	250-	7.8	6.9	85.3
	Total	**6.4**	**4.9**	**88.7**
Manufacturing	10-49	3.5	4.3	92.2
	50-249	2.3	2.9	94.8
	250-	11.2	9.4	79.4
	Total	**7.8**	**7.0**	**85.1**
Services	10-49	5.0	3.0	92.0
	50-249	7.8	2.2	90.0
	250-	2.2	2.5	95.3
	Total	**5.0**	**2.5**	**92.5**

Appendix table 10. Proportion of product innovations and unchanged products of turnover by industry, 2016, proportions of the total turnover of all enterprises

Industry	Products new to the market	Products new only to the enterprise	Unchanged products
	%	%	%
05-09 Mining and quarrying	1.1	0.7	98.2
10-12 Food products and beverages	2.6	7.7	89.7
13 Textiles	0.7	2.7	96.6
14 Wearing apparel	0.5	1.5	98.0
15 Leather and related products	3.3	7.5	89.2
16 Wood, products of wood, and cork	7.1	2.2	90.7
17 Paper and paper products	2.4	4.7	92.9
18 Printing and reproduction of recorded media	3.3	4.6	92.1
19-21 Chemicals and chemical products	20.1	2.4	77.5
22 Rubber and plastic products	2.4	7.0	90.6
23 Other non-metallic mineral products	3.1	2.2	94.7
24 Basic metals	20.0	22.9	57.2
25 Fabricated metal products, except machinery and equipment	2.8	3.5	93.7
26 Computer, electronic and optical products	12.1	9.6	78.3
27 Electrical equipment	8.9	10.6	80.4
28 Machinery and equipment n.e.c.	5.8	8.1	86.1
29 Motor vehicles, trailers and semi-trailers	3.7	12.8	83.4
30 Other transport equipment	7.0	4.9	88.2
31 Furniture	2.0	3.7	94.3
32 Other manufacturing	10.5	12.4	77.0
33 Repair and installation of machinery and equipment	1.8	2.3	95.9
35 Electricity, gas, steam and air conditioning supply	3.0	4.0	93.0
36 Water collection, treatment and supply	0.0	42.3	57.7
37-39 Sewerage, waste treatment	3.8	3.0	93.2
46 Wholesale trade, except of motor vehicles and motorcycles	5.3	1.7	93.0
49-52 Transportation and storage	0.3	1.1	98.6
53 Postal and courier activities	3.2	1.8	95.0
58 Publishing activities	0.4	5.0	94.6
59 Programme production, sound recording and music publishing activities	2.4	1.2	96.4
60 Programming and broadcasting activities	0.0	0.0	100.0
61 Telecommunications	7.3	1.0	91.7
62 Computer programming, consultancy and related activities	19.5	4.5	75.9
63 Information service activities	8.2	4.0	87.8
64 Financial service activities	0.5	7.6	92.0
65 Insurance, reinsurance and pension funding	1.0	1.1	97.8
66 Activities auxiliary to financial services and insurance activities	2.1	1.0	97.0
71 Architectural and engineering activities; technical testing and analysis	4.0	3.3	92.8
72 Scientific research and development	31.7	34.8	33.5
73 Advertising and market research	3.8	2.6	93.5
All NACE - Total	**6.4**	**4.9**	**88.7**
05-39 Manufacturing, total	**7.8**	**7.0**	**85.1**
46, 49-53, 58-66, 71-73 Services, total	**5.0**	**2.5**	**92.5**

Appendix table 11. Developers of process innovations by size category of personnel, 2014-2016, share of enterprises with process innovations

Industry	Size category of personnel	Number of enterprises	Own enterprise by itself	Own enterprise together with others	Own enterprise by adapting or modifying processes developed by others	Other enterprises or institutions
			%	%	%	%
All NACE - Total	10-49	2445	55.0	56.7	23.4	16.6
	50-249	817	55.9	57.9	31.9	16.2
	250-	221	66.7	77.5	30.8	18.4
	Total	**3482**	**56.0**	**58.3**	**25.8**	**16.6**
Manufacturing	10-49	1157	51.0	61.0	22.0	16.6
	50-249	468	54.1	59.9	34.3	14.6
	250-	143	65.5	79.1	34.7	18.5
	Total	**1767**	**53.0**	**62.2**	**26.3**	**16.3**
Services	10-49	1288	58.6	52.9	24.6	16.5
	50-249	349	58.3	55.2	28.7	18.4
	250-	78	69.0	74.4	23.7	18.2
	Total	**1716**	**59.0**	**54.3**	**25.4**	**17.0**

Appendix table 12. Developers of process innovations by industry 2014-2016, share of enterprises with process innovations

Industry	Number of enter-prises	Own enterprise by itself	Own enterprise together with others	Own enterprise by adapting or modifying processes developed by others	Other enter-prises or institu-tions
		%	%	%	%
05-09 Mining and quarrying	23	71.5	39.5	28.5	4.4
10-12 Food products and beverages	186	62.9	68.1	25.4	17.9
13 Textiles	8	42.5	66.0	12.7	17.0
14 Wearing apparel	7	0.0	30.3	79.8	0.0
15 Leather and related products	4	0.0	100.0	54.5	0.0
16 Wood, products of wood, and cork	112	65.5	72.2	27.7	17.6
17 Paper and paper products	50	60.4	54.3	20.9	12.4
18 Printing and reproduction of recorded media	50	40.5	56.9	21.7	21.7
19-21 Chemicals and chemical products	58	59.9	67.1	19.1	19.7
22 Rubber and plastic products	99	39.0	78.1	32.8	14.8
23 Other non-metallic mineral products	85	37.3	70.3	10.7	15.0
24 Basic metals	20	60.8	35.4	34.2	35.4
25 Fabricated metal products, excl. machinery, equip.	339	47.8	52.6	21.1	18.1
26 Computer, electronic and optical products	74	67.6	53.0	41.2	6.8
27 Electrical equipment	91	54.5	67.5	32.3	12.0
28 Machinery and equipment n.e.c.	225	56.6	66.5	26.1	8.2
29 Motor vehicles, trailers and semi-trailers	32	39.1	72.5	21.8	3.9
30 Other transport equipment	29	67.9	59.8	27.6	15.1
31 Furniture	62	76.2	42.2	47.6	23.8
32 Other manufacturing	38	43.3	77.0	23.0	20.3
33 Repair and installation of machinery and equipment	48	48.1	49.7	8.6	21.7
35 Electricity, gas, steam and air conditioning supply	65	32.1	78.4	25.3	17.0
36 Water collection, treatment and supply	12	35.7	63.3	35.7	44.7
37-39 Sewerage, waste treatment	49	52.2	48.5	44.4	36.9
46 Wholesale trade, excl. motor vehicles, motorcycles	448	44.4	57.2	23.8	18.7
49-52 Transportation and storage	326	56.2	59.5	22.2	14.8
53 Postal and courier activities	17	77.9	53.0	49.3	0.0
58 Publishing activities	56	38.2	75.3	14.8	20.5
59 Programme production, sound recording, music publ.	21	100.0	64.2	10.5	10.5
60 Programming and broadcasting activities	..	..	..	..	..
61 Telecommunications	32	88.4	70.5	49.6	0.0
62 Computer programming, consultancy and related activities	339	81.3	46.6	29.5	16.9
63 Information service activities	20	77.0	10.6	0.0	46.0
64 Financial service activities	92	27.4	49.4	25.4	30.9
65 Insurance, reinsurance and pension funding	25	58.9	77.8	18.9	14.8
66 Activities auxiliary to financial services and insurance	25	60.0	72.0	28.0	24.0
71 Architectural and engineering activities; testing, analysis	236	62.4	52.6	23.3	15.4
72 Scientific research and development	32	71.9	56.3	10.1	13.3
73 Advertising and market research	45	66.0	19.2	61.8	0.0
All NACE - Total	**3482**	**56.0**	**58.3**	**25.8**	**16.6**
05-39 Manufacturing, total	**1767**	**53.0**	**62.2**	**26.3**	**16.3**
46, 49-53, 58-66, 71-73 Services, total	**1716**	**59.0**	**54.3**	**25.4**	**17.0**

Appendix table 13. Sources of information for innovation activities relating to products or processes 2014–2016, importance of sources, share of enterprises with innovation activity relating to products or processes

Industry		High importance	Medium importance	Low importance	Not used
		%	%	%	%
All NACE - Total	Own enterprise or enterprise group	62.1	26.8	6.0	5.2
	Suppliers of equipment, materials, components or software	22.6	46.2	20.1	11.2
	Clients or customers from the private sector	24.8	36.4	23.2	15.6
	Clients or customers from the public sector	9.2	18.9	36.5	35.4
	Competitors or other enterprises in the industry	8.8	44.3	32.6	14.4
	Consultants or commercial labs	3.3	23.6	40.3	32.8
	Universities or other higher education institutions	4.5	21.3	35.5	38.7
	Public research institutes	3.2	15.1	35.4	46.3
	Private research institutes	1.9	12.5	35.0	50.6
	Conferences, trade fairs, exhibitions	9.4	39.5	35.7	15.5
	Scientific/technical journals or trade publications	4.5	26.5	47.2	21.8
	Professional and industry associations	3.2	18.9	45.2	32.8
Manufacturing	Own enterprise or enterprise group	59.3	30.4	5.6	4.7
	Suppliers of equipment, materials, components or software	26.8	51.9	15.7	5.6
	Clients or customers from the private sector	26.2	34.5	24.0	15.3
	Clients or customers from the public sector	6.4	16.8	40.1	36.7
	Competitors or other enterprises in the industry	8.5	44.7	33.5	13.3
	Consultants or commercial labs	3.6	27.7	42.9	25.8
	Universities or other higher education institutions	4.5	26.7	38.8	30.1
	Public research institutes	3.0	17.8	40.3	38.9
	Private research institutes	1.6	14.3	40.6	43.5
	Conferences, trade fairs, exhibitions	10.2	40.3	36.6	12.9
	Scientific/technical journals or trade publications	4.8	28.1	47.9	19.2
	Professional and industry associations	3.5	20.7	46.4	29.4
Services	Own enterprise or enterprise group	64.7	23.3	6.4	5.7
	Suppliers of equipment, materials, components or software	18.6	40.7	24.2	16.5
	Clients or customers from the private sector	23.5	38.2	22.4	15.9
	Clients or customers from the public sector	12.0	20.9	33.0	34.2
	Competitors or other enterprises in the industry	9.0	43.8	31.7	15.5
	Consultants or commercial labs	2.9	19.7	37.8	39.5
	Universities or other higher education institutions	4.5	16.2	32.3	47.0
	Public research institutes	3.3	12.6	30.7	53.4
	Private research institutes	2.2	10.8	29.6	57.4
	Conferences, trade fairs, exhibitions	8.6	38.7	34.8	18.0
	Scientific/technical journals or trade publications	4.2	24.9	46.6	24.4
	Professional and industry associations	2.9	17.1	44.1	35.9

Appendix table 14. Co-operation in innovation activity by location of co-operating partner 2014–2016, share of enterprises with innovation activity

Industry	Co-operation partner	Location of co-operation partner						
		Finland	Other Europe	United States	China	India	All other countries	Co-operation
		%	%	%	%	%	%	%
All NACE – Total	Other enterprises within the enterprise group	10.8	9.4	2.5	1.5	0.7	1.2	17.1
	Suppliers of equipment, materials, components or software	22.3	14.6	3.6	2.0	0.4	1.8	29.0
	Clients or customers from the private sector	21.8	9.9	3.3	1.7	0.8	3.0	25.6
	Clients or customers from the public sector	14.1	2.3	0.4	0.3	0.1	1.9	16.4
	Competitors or other enterprises in the sector	15.0	7.4	1.8	1.0	0.3	2.2	19.7
	Consultants or commercial labs	16.0	5.4	1.1	0.4	0.2	1.8	18.8
	Universities or other higher education institutions	22.2	4.8	0.7	0.5	0.2	1.4	23.8
	Public research institutes	14.1	2.6	0.3	0.1	0.0	1.5	16.0
	Private research institutes	10.2	2.8	0.5	0.2	0.0	1.9	13.1
Manufacturing	Other enterprises within the enterprise group	12.6	11.3	2.8	2.2	0.8	1.7	19.5
	Suppliers of equipment, materials, components or software	26.1	19.9	4.0	2.8	0.5	2.3	33.6
	Clients or customers from the private sector	25.1	14.7	5.0	2.8	1.3	4.8	29.8
	Clients or customers from the public sector	16.2	2.6	0.6	0.7	0.3	2.6	18.4
	Competitors or other enterprises in the sector	15.5	9.5	2.1	0.9	0.5	3.0	21.2
	Consultants or commercial labs	19.8	7.2	1.3	0.7	0.3	2.0	22.7
	Universities or other higher education institutions	29.5	6.2	0.9	0.8	0.2	1.6	30.6
	Public research institutes	18.1	3.8	0.3	0.2	0.1	1.8	20.0
	Private research institutes	11.9	3.7	0.7	0.1	0.1	2.6	15.6
Services	Other enterprises within the enterprise group	9.1	7.6	2.1	0.8	0.7	0.7	14.7
	Suppliers of equipment, materials, components or software	18.7	9.4	3.2	1.2	0.4	1.4	24.6
	Clients or customers from the private sector	18.6	5.4	1.7	0.6	0.3	1.3	21.5
	Clients or customers from the public sector	12.1	2.1	0.2	0.0	0.0	1.3	14.5
	Competitors or other enterprises in the sector	14.5	5.3	1.5	1.1	0.1	1.4	18.1
	Consultants or commercial labs	12.3	3.6	0.8	0.0	0.1	1.5	15.1
	Universities or other higher education institutions	15.1	3.4	0.5	0.2	0.1	1.2	17.2
	Public research institutes	10.3	1.4	0.3	0.0	0.0	1.2	12.1
	Private research institutes	8.5	1.9	0.4	0.3	0.0	1.2	10.6

Appendix table 15. Cooperation for innovation activities by co-operation partner and size category of personnel, 2014–2016, share of enterprises with innovation activity relating to products and processes

Industry	Size category of personnel	Number of enterprises	Other enterprises within the group	Suppliers of equipment, materials etc.	Clients or customers from the private sector	Clients or customers from the public sector	Competitors or other enterprises in the industry	Consultants or commercial labs	Universities or other higher education institutions	Public research institutes	Private research institutes
			%	%	%	%	%	%	%	%	%
All NACE - Total	10-49	3546	10.3	23.6	21.1	13.1	15.6	13.5	17.7	11.6	9.5
	50-249	1114	26.7	37.1	31.1	19.7	25.7	26.4	32.9	21.1	17.9
	250-	284	63.7	64.1	59.3	44.6	47.0	55.4	64.0	50.8	39.2
	Total	**4945**	**17.1**	**29.0**	**25.6**	**16.4**	**19.7**	**18.8**	**23.8**	**16.0**	**13.1**
Manufacturing	10-49	1616	10.8	26.3	24.2	14.3	16.0	16.3	21.9	13.7	10.7
	50-249	636	27.6	41.1	34.4	21.0	25.5	28.4	40.4	24.5	20.4
	250-	173	71.5	74.6	65.8	47.6	54.6	61.8	76.0	62.9	44.6
	Total	**2424**	**19.5**	**33.6**	**29.8**	**18.4**	**21.2**	**22.7**	**30.6**	**20.0**	**15.6**
Services	10-49	1931	9.8	21.4	18.5	12.1	15.2	11.3	14.1	9.8	8.4
	50-249	478	25.5	31.9	26.9	18.0	25.8	23.6	22.9	16.7	14.7
	250-	112	51.6	47.9	49.4	39.9	35.4	45.5	45.5	32.2	30.7
	Total	**2521**	**14.7**	**24.6**	**21.5**	**14.5**	**18.1**	**15.1**	**17.2**	**12.1**	**10.6**

Appendix table 16. Cooperation for innovation activities by co-operation partner and industry, 2014–2016, share of enterprises with innovation activity relating to products and processes (N=4945)

Industry	Other enterprises within the group	Suppliers of equipment, materials etc.	Clients or customers from the private sector	Clients or customers from the public sector	Competitors or other enterprises in the industry	Consultants or commercial labs	Universities or other higher education institutions	Public research institutes	Private research institutes
	%	%	%	%	%	%	%	%	%
05-09 Mining and quarrying	16.9	16.9	13.5	6.8	13.5	13.5	16.9	13.5	13.5
10-12 Food products and beverages	20.0	40.3	33.7	25.4	18.1	24.9	25.9	21.0	18.5
13 Textiles	15.0	44.1	12.9	0.0	0.0	0.0	6.4	6.4	0.0
14 Wearing apparel	0.0	0.0	0.0	0.0	0.0	0.0	7.1	0.0	0.0
15 Leather and related products	47.8	47.8	0.0	0.0	0.0	21.7	0.0	0.0	0.0
16 Wood, products of wood, and cork	6.2	29.7	25.3	16.0	14.4	22.3	22.5	15.9	16.0
17 Paper and paper products	34.8	44.0	42.1	22.0	25.6	31.1	40.3	34.8	27.6
18 Printing and reproduction of recorded media	15.0	10.5	15.0	10.5	10.5	10.5	10.5	10.5	8.4
19-21 Chemicals and chemical products	43.7	46.8	49.4	20.5	30.5	32.4	57.2	33.9	30.1
22 Rubber and plastic products	24.8	41.2	34.7	12.4	19.0	23.9	34.3	20.6	17.3
23 Other non-metallic mineral products	22.0	42.1	19.8	22.3	21.1	25.8	19.8	22.3	15.1
24 Basic metals	39.5	33.9	49.2	3.2	19.4	28.2	53.2	34.7	15.3
25 Fabricated metal products, except machinery and equipment	9.3	22.2	19.0	10.6	16.7	17.0	22.4	11.6	9.7
26 Computer, electronic and optical products	35.5	53.9	50.4	28.6	33.6	30.5	58.0	33.3	17.3
27 Electrical equipment	13.7	39.1	37.4	23.9	21.2	26.6	34.3	27.9	24.4
28 Machinery and equipment n.e.c.	28.0	33.8	34.0	17.4	23.6	26.2	32.0	17.4	16.0
29 Motor vehicles, trailers and semi-trailers	19.6	35.8	39.6	25.7	29.6	29.6	49.7	25.7	23.1
30 Other transport equipment	11.9	42.9	35.7	28.5	28.5	30.3	28.5	23.1	11.9
31 Furniture	5.4	16.4	16.4	16.4	13.6	5.4	14.9	8.2	5.4
32 Other manufacturing	5.2	40.1	17.8	20.4	24.0	11.5	33.9	6.3	7.9
33 Repair and installation of machinery and equipment	2.8	12.8	27.1	12.8	10.0	12.8	12.8	12.8	10.0
35 Electricity, gas, steam and air conditioning supply	32.3	44.9	38.0	34.2	47.8	29.9	51.2	38.6	25.8

Industry	Other enterprises within the group	Suppliers of equipment, materials etc.	Clients or customers from the private sector	Clients or customers from the public sector	Competitors or other enterprises in the industry	Consultants or commercial labs	Universities or other higher education institutions	Public research institutes	Private research institutes
	%	%	%	%	%	%	%	%	%
36 Water collection, treatment and supply	8.0	44.7	8.0	8.0	17.0	17.0	17.0	17.0	8.0
37-39 Sewerage, waste treatment	21.0	32.1	26.5	29.2	26.5	31.6	40.2	34.5	15.5
46 Wholesale trade, except of motor vehicles and motorcycles	19.2	26.4	18.0	13.1	16.2	13.5	13.0	7.9	10.2
49-52 Transportation and storage	4.9	17.9	12.4	7.7	12.5	8.8	7.6	7.6	6.4
53 Postal and courier activities	19.9	19.9	36.7	11.8	28.0	11.8	5.9	5.9	11.8
58 Publishing activities	23.4	37.2	28.2	28.2	31.2	34.2	32.6	20.2	24.6
59 Programme production, sound recording and music publishing activities	0.0	18.8	6.9	11.9	11.9	6.9	0.0	6.9	0.0
60 Programming and broadcasting activities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61 Telecommunications	23.0	47.5	47.5	31.1	47.5	37.1	31.1	31.1	28.9
62 Computer programming, consultancy and related activities	13.8	22.1	26.7	18.8	18.3	15.9	22.9	11.3	9.9
63 Information service activities	13.9	13.9	11.5	0.0	13.9	0.0	22.9	11.5	0.0
64 Financial service activities	15.9	18.4	12.0	5.6	11.2	9.9	9.0	4.7	4.7
65 Insurance, reinsurance and pension funding	34.8	23.9	23.9	15.1	17.6	23.9	20.7	15.1	17.6
66 Activities auxiliary to financial services and insurance activities	20.4	20.4	6.1	4.1	8.2	8.2	4.1	2.0	4.1
71 Architectural and engineering activities; technical testing and analysis	15.7	31.6	29.6	21.6	25.7	24.0	29.7	27.4	17.3
72 Scientific research and development	25.8	37.7	51.1	8.8	17.6	13.9	37.7	25.8	8.8
73 Advertising and market research	3.2	21.3	27.7	19.2	25.6	14.9	12.8	12.8	12.8
All NACE - Total	**17.1**	**29.0**	**25.6**	**16.4**	**19.7**	**18.8**	**23.8**	**16.0**	**13.1**
05-39 Manufacturing, total	**19.5**	**33.6**	**29.8**	**18.4**	**21.2**	**22.7**	**30.6**	**20.0**	**15.6**
46, 49-53, 58-66, 71-73 Services, total	**14.7**	**24.6**	**21.5**	**14.5**	**18.1**	**15.1**	**17.2**	**12.1**	**10.6**

Appendix table 17. Factors hampering innovation activities 2014-2016, importance of factors, share of enterprises with innovation activity

Industry		High importance	Medium importance	Low importance	Not important
		%	%	%	%
All NACE - Total	Lack of internal finance for innovation	14.3	24.2	27.5	34.0
	Lack of credit or private equity	6.7	14.2	29.2	49.9
	Innovation costs too high	12.2	33.1	27.5	27.3
	Lack of skilled employees within the enterprise	12.0	35.0	33.1	19.9
	Lack of collaboration partners	2.3	21.8	43.3	32.7
	Difficulties in obtaining government grants or subsidies for innovation	9.0	17.2	29.7	44.1
	Uncertain market demand for the ideas for innovations	8.6	28.5	30.5	32.3
	Too much competition in the market	9.4	30.4	32.3	27.9
Manufacturing	Lack of internal finance for innovation	16.8	28.3	26.9	28.0
	Lack of credit or private equity	6.7	16.2	35.2	41.8
	Innovation costs too high	14.3	33.9	30.5	21.3
	Lack of skilled employees within the enterprise	10.2	39.8	34.1	15.9
	Lack of collaboration partners	2.5	21.7	46.4	29.4
	Difficulties in obtaining government grants or subsidies for innovation	10.5	19.3	34.5	35.7
	Uncertain market demand for the ideas for innovations	10.0	30.3	32.6	27.1
	Too much competition in the market	11.8	31.3	33.0	23.8
Services	Lack of internal finance for innovation	12.1	20.4	28.1	39.5
	Lack of credit or private equity	6.6	12.4	23.7	57.3
	Innovation costs too high	10.2	32.3	24.7	32.8
	Lack of skilled employees within the enterprise	13.7	30.6	32.2	23.6
	Lack of collaboration partners	2.0	21.9	40.4	35.7
	Difficulties in obtaining government grants or subsidies for innovation	7.6	15.3	25.3	51.8
	Uncertain market demand for the ideas for innovations	7.4	26.9	28.7	37.1
	Too much competition in the market	7.1	29.6	31.7	31.6

Appendix table 18. Factors hampering innovation activities by size category of personnel 2014-2016, high or medium importance, share of enterprises with innovation activity

Industry	Size category of personnel	Number of enterprises	Lack of internal finance	Lack of credit or private equity	Innovation costs too high	Lack of skilled employees	Lack of collaboration partners	No government grants or subsidies	Uncertain market demand	Too much competition
			%	%	%	%	%	%	%	%
All NACE - Total	10-49	3950	39.2	23.6	45.7	45.0	25.1	27.0	36.3	39.7
	50-249	1251	37.7	15.7	45.7	53.5	22.0	24.2	38.7	39.9
	250-	299	32.0	7.1	37.3	46.7	18.5	24.2	42.0	39.3
	Total	**5499**	**38.5**	**20.9**	**45.2**	**47.0**	**24.0**	**26.2**	**37.2**	**39.8**
Manufacturing	10-49	1768	45.7	25.2	49.1	47.8	23.5	29.9	39.1	42.5
	50-249	684	44.8	21.0	48.7	56.0	26.7	28.9	42.7	45.4
	250-	176	40.3	8.3	36.5	48.7	21.4	32.5	43.1	41.1
	Total	**2628**	**45.1**	**23.0**	**48.1**	**50.0**	**24.2**	**29.8**	**40.3**	**43.2**
Services	10-49	2182	34.0	22.3	42.9	42.7	26.4	24.7	34.0	37.5
	50-249	568	29.1	9.4	42.1	50.5	16.3	18.4	33.9	33.3
	250-	122	20.0	5.4	38.5	43.8	14.4	12.2	40.4	36.7
	Total	**2871**	**32.4**	**19.0**	**42.5**	**44.2**	**23.9**	**22.9**	**34.3**	**36.6**

Appendix table 19. Factors hampering innovation activities by industry 2014-2016, high or medium importance, share of enterprises with innovation activity

Industy	Number of enter-prises	Lack of internal finance	Lack of credit or private equity	Inno-vation costs too high	Lack of skilled employ-ees	Lack of collabo-ration partners	No govern-ment grants or subsidies	Uncertain market demand	Too much compe-tition
		%	%	%	%	%	%	%	%
05-09 Mining and quarrying	35	59.6	29.1	53.9	36.2	18.4	24.8	24.1	34.7
10-12 Food products and beverages	276	30.2	15.3	33.1	39.1	24.0	24.7	43.1	55.2
13 Textiles	19	51.8	24.1	51.8	39.3	27.7	41.1	29.4	29.4
14 Wearing apparel	23	58.4	52.0	14.0	39.4	28.7	63.8	41.6	44.8
15 Leather and related products	9	52.2	0.0	0.0	52.2	26.1	0.0	0.0	0.0
16 Wood, products of wood, and cork	148	46.4	23.1	51.6	43.1	15.7	33.9	39.4	38.6
17 Paper and paper products	62	49.0	32.0	52.4	55.9	40.7	40.4	51.0	47.5
18 Printing and reproduction of recorded media	68	54.4	29.5	57.8	56.3	22.1	45.9	66.2	55.5
19-21 Chemicals and chemical products	97	41.6	17.9	46.4	39.3	23.2	21.4	30.9	39.7
22 Rubber and plastic products	141	36.3	20.3	48.4	62.9	20.0	29.8	31.6	48.7
23 Other non-metallic mineral products	99	54.4	23.0	39.1	47.3	34.5	25.3	34.8	55.4
24 Basic metals	34	41.5	29.6	46.7	49.6	16.3	32.6	39.3	60.7
25 Fabricated metal products, except machinery and equipment	451	51.0	25.4	57.7	53.6	24.3	31.0	41.5	38.0
26 Computer, electronic and optical products	129	61.5	31.5	65.7	62.3	31.2	29.1	35.5	32.3
27 Electrical equipment	130	57.4	33.1	61.3	70.2	34.3	44.6	49.8	70.8
28 Machinery and equipment n.e.c.	352	51.0	23.5	52.7	50.6	28.5	31.6	43.4	41.1
29 Motor vehicles, trailers and semi-trailers	61	29.4	6.7	37.1	45.7	9.1	14.8	19.4	40.7
30 Other transport equipment	45	62.2	35.7	67.3	40.6	15.5	42.4	57.0	48.0
31 Furniture	96	54.9	29.6	37.4	40.6	4.5	36.4	41.8	62.7
32 Other manufacturing	62	43.7	22.4	50.0	53.6	8.8	16.1	27.6	43.7
33 Repair and installation of machinery and equipment	85	23.5	13.7	38.3	55.6	8.6	27.1	39.7	26.0
35 Electricity, gas, steam and air conditioning supply	110	20.4	10.9	35.0	52.5	25.5	14.4	44.2	29.3
36 Water collection, treatment and supply	14	7.3	0.0	32.7	23.9	49.2	23.9	7.3	0.0
37-39 Sewerage, waste treatment	85	30.1	18.0	25.8	33.3	43.3	21.3	37.5	11.8
46 Wholesale trade, except of motor vehicles and motorcycles	857	27.9	16.1	35.7	39.2	25.0	15.4	27.8	29.0
49-52 Transportation and storage	508	29.5	18.8	41.3	40.5	25.3	30.2	31.6	49.4
53 Postal and courier activities	17	0.0	0.0	0.0	5.9	8.1	0.0	11.8	36.7
58 Publishing activities	79	50.9	17.4	70.0	54.7	27.0	35.5	48.3	54.9

Industy	Number of enter-prises	Lack of internal finance	Lack of credit or private equity	Inno-vation costs too high	Lack of skilled employ-ees	Lack of collabo-ration partners	No govern-ment grants or subsidies	Uncertain market demand	Too much compe-tition
		%	%	%	%	%	%	%	%
59 Programme production, sound recording and music publishing activities	36	47.0	21.2	33.6	16.8	21.2	38.0	51.4	48.6
60 Programming and broadcasting activities	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61 Telecommunications	48	31.4	15.7	44.0	78.0	49.1	19.9	60.2	50.3
62 Computer programming, consultancy and related activities	518	41.7	27.0	45.8	54.7	20.5	25.8	37.6	32.1
63 Information service activities	41	49.8	22.9	32.2	61.3	34.4	36.8	69.4	70.3
64 Financial service activities	144	10.3	4.9	32.3	41.4	18.2	8.0	16.3	17.1
65 Insurance, reinsurance and pension funding	35	7.9	5.1	32.8	30.5	0.0	0.0	22.9	17.8
66 Activities auxiliary to financial services and insurance activities	65	3.1	0.0	24.6	35.4	10.8	9.2	26.2	44.6
71 Architectural and engineering activities; technical testing and analysis	358	43.7	24.4	61.1	50.7	30.5	34.5	52.4	44.1
72 Scientific research and development	48	65.4	52.0	63.9	32.5	25.3	32.0	35.5	38.6
73 Advertising and market research	116	22.5	10.9	37.5	36.6	11.7	13.3	19.2	25.8
All NACE - Total	**5499**	**38.5**	**20.9**	**45.2**	**47.0**	**24.0**	**26.2**	**37.2**	**39.8**
05-39 Manufacturing, total	**2628**	**45.1**	**23.0**	**48.1**	**50.0**	**24.2**	**29.8**	**40.3**	**43.2**
46, 49-53, 58-66, 71-73 Services, total	**2871**	**32.4**	**19.0**	**42.5**	**44.2**	**23.9**	**22.9**	**34.3**	**36.6**

Appendix table 20. Effects of legislation or regulation on innovation activities 2014–2016, share of enterprises with innovation activity

Industry/ Legislation or regulation	Stimulated innovation	Created no major problems	Created uncertainty	Generated an excessive burden	Lack consistency across the EU	Not relevant
	%	%	%	%	%	%
All NACE -Total						
Product safety/consumer protection	6.5	36.3	6.7	10.7	2.3	41.1
Operational and worker safety	4.8	41.4	5.3	8.7	0.9	40.3
Environmental	6.8	38.6	5.8	8.0	1.8	41.9
Intellectual property	4.2	41.1	9.2	5.5	0.6	41.3
Tax	0.9	41.8	7.2	5.6	1.3	44.4
Employment and social affairs	1.6	40.4	5.2	5.9	0.9	46.7
Data protection	3.5	41.4	11.1	8.6	1.0	36.7
Other	2.2	39.3	6.6	5.8	2.0	46.0
Manufacturing						
Product safety/consumer protection	9.0	40.6	6.8	11.8	3.7	32.8
Operational and worker safety	5.2	47.8	5.9	9.6	1.4	31.5
Environmental	8.6	43.7	8.2	10.8	2.8	29.5
Intellectual property	4.8	44.8	9.3	5.7	0.5	37.3
Tax	1.0	48.2	5.5	4.9	1.7	39.6
Employment and social affairs	1.2	46.8	4.5	5.1	1.6	41.4
Data protection	2.0	49.2	8.2	5.6	1.1	35.2
Other	2.5	45.6	6.2	5.5	2.0	39.9
Services						
Product safety/consumer protection	4.2	32.4	6.6	9.7	1.0	48.7
Operational and worker safety	4.3	35.5	4.7	7.8	0.5	48.4
Environmental	5.1	33.8	3.5	5.4	0.9	53.2
Intellectual property	3.7	37.7	9.2	5.2	0.6	44.9
Tax	0.9	35.9	8.8	6.2	1.0	48.9
Employment and social affairs	2.0	34.5	5.9	6.6	0.3	51.5
Data protection	4.9	34.3	13.7	11.3	0.9	38.1
Other	1.9	33.5	7.0	6.1	2.0	51.7

Appendix table 21. Effects of legislation and regulations on innovation activities by industry 2014-2016, share of enterprises with innovation activity

Industry	Number of enterprises	Legislation to some extent stimulated innovation activity	Legislation to some extent created uncertainty	Legislation to some extent generated an excessive burden	Legislation to some extent lacked consistency across the EU	Legislation created no major problems	Legislation was not relevant here
		%	%	%	%	%	%
05-09 Mining and quarrying	35	11.3	39.0	8.5	5.7	22.0	36.2
10-12 Food products and beverages	276	22.7	23.5	32.3	13.5	22.4	10.0
13 Textiles	19	0.0	10.7	5.3	5.3	31.2	58.1
14 Wearing apparel	23	3.2	36.2	47.7	0.0	9.7	31.9
15 Leather and related products	9	21.7	0.0	0.0	0.0	52.2	0.0
16 Wood, products of wood, and cork	148	17.9	34.8	35.9	7.9	18.5	23.7
17 Paper and paper products	62	17.0	33.9	25.6	17.1	23.8	21.9
18 Printing and reproduction of recorded media	68	9.9	15.6	31.5	0.0	4.3	56.3
19-21 Chemicals and chemical products	97	25.1	33.7	30.2	11.7	23.4	7.5
22 Rubber and plastic products	141	16.4	22.6	21.1	6.6	33.4	21.8
23 Other non-metallic mineral products	99	10.9	31.4	16.4	2.0	20.0	44.4
24 Basic metals	34	11.9	31.1	46.7	11.1	11.1	25.2
25 Fabricated metal products, except machinery and equipment	451	15.0	25.4	12.5	4.5	28.9	28.5
26 Computer, electronic and optical products	129	25.2	34.3	34.8	6.8	27.6	8.0
27 Electrical equipment	130	19.4	28.4	24.0	6.7	33.3	10.4
28 Machinery and equipment n.e.c.	352	19.4	28.6	25.5	4.0	35.5	8.7
29 Motor vehicles, trailers and semi-trailers	61	8.7	27.1	20.3	1.6	29.1	23.2
30 Other transport equipment	45	15.5	38.4	25.9	6.7	22.4	16.9
31 Furniture	96	7.6	44.0	17.7	0.0	32.9	19.8
32 Other manufacturing	62	9.9	24.9	35.8	12.5	30.3	22.4
33 Repair and installation of machinery and equipment	85	10.0	13.7	33.4	7.6	35.6	20.9
35 Electricity, gas, steam and air conditioning supply	110	25.3	27.3	24.2	4.4	28.6	13.1
36 Water collection, treatment and supply	14	23.9	23.9	49.2	0.0	25.4	25.4
37-39 Sewerage, waste treatment	85	24.7	56.7	55.6	24.6	18.9	0.0
46 Wholesale trade, except of motor vehicles and motorcycles	857	14.0	20.4	21.8	6.3	29.7	26.5
49-52 Transportation and storage	508	9.0	30.7	28.1	7.2	22.1	34.2
53 Postal and courier activities	17	0.0	69.8	8.1	0.0	8.1	22.1

Industry	Number of enterprises	Legislation to some extent stimulated innovation activity	Legislation to some extent created uncertainty	Legislation to some extent generated an excessive burden	Legislation to some extent lacked consistency across the EU	Legislation created no major problems	Legislation was not relevant here
		%	%	%	%	%	%
58 Publishing activities	79	13.2	49.2	26.3	1.9	20.1	17.3
59 Programme production, sound recording and music publishing activities	36	10.6	44.2	0.0	10.6	34.6	10.6
60 Programming and broadcasting activities	..	0.0	100.0	100.0	0.0	0.0	0.0
61 Telecommunications	48	16.3	18.4	47.6	2.1	14.1	19.9
62 Computer programming, consultancy and related activities	518	23.6	36.1	33.0	4.4	25.0	12.9
63 Information service activities	41	19.2	24.4	16.7	0.0	33.5	28.2
64 Financial service activities	144	17.1	31.8	37.5	0.0	8.8	34.4
65 Insurance, reinsurance and pension funding	35	36.0	15.3	43.6	0.0	12.7	15.3
66 Activities auxiliary to financial services and insurance activities	65	1.5	66.2	52.3	23.1	0.0	29.2
71 Architectural and engineering activities; technical testing and analysis	358	19.0	33.3	13.5	2.6	20.4	32.5
72 Scientific research and development	48	10.3	45.9	27.3	13.9	20.1	22.2
73 Advertising and market research	116	15.0	18.3	15.0	5.0	22.5	34.1
All NACE - Total	**5499**	**16.4**	**29.5**	**25.7**	**6.2**	**25.2**	**22.9**
05-39 Manufacturing, total	**2628**	**17.3**	**28.9**	**25.8**	**7.0**	**27.2**	**19.3**
46, 49-53, 58-66, 71-73 Services, total	**2871**	**15.6**	**30.0**	**25.6**	**5.5**	**23.4**	**26.1**

Appendix table 22. Utilisation of big data and public sector open data in enterprises 2014-2016, importance of the use of data, share of enterprises

		High importance	Medium importance	Low importance	Not relevant
		%	%	%	%
All NACE - Total	Use of big data in developing new products	5.1	10.1	22.4	62.4
	Use of public sector open data in developing new products	1.8	9.0	25.8	63.4
	Use of big data in improving products	4.9	9.8	23.8	61.5
	Use of public sector open data in improving products	1.8	8.1	26.9	63.2
	Use of data in developing process innovations	4.7	12.6	25.7	57.0
	Use of data in developing organisational innovations	2.5	9.4	28.5	59.6
	Use of data in developing marketing innovations	4.1	14.0	25.3	56.6
	Use of data in research and development	6.2	14.0	23.5	56.2
	Use of data in managing production process	5.8	12.8	24.2	57.3
	Use of data in marketing	4.8	18.4	25.7	51.2
	Selling big data to other enterprises	1.1	4.5	15.5	78.9
	Buying big data from other enterprises	1.3	6.8	21.2	70.6
Manufacturing	Use of big data in developing new products	3.0	8.0	23.9	65.1
	Use of public sector open data in developing new products	1.1	6.7	26.9	65.3
	Use of big data in improving products	2.9	8.0	24.6	64.5
	Use of public sector open data in improving products	1.1	5.1	27.5	66.3
	Use of data in developing process innovations	4.4	12.6	29.1	54.0
	Use of data in developing organisational innovations	1.2	8.5	31.4	59.0
	Use of data in developing marketing innovations	2.5	11.8	28.4	57.4
	Use of data in research and development	4.9	14.3	26.6	54.1
	Use of data in managing production process	6.9	13.8	26.6	52.7
	Use of data in marketing	3.1	14.9	29.1	52.9
	Selling big data to other enterprises	0.6	4.4	17.8	77.3
	Buying big data from other enterprises	0.7	5.6	21.5	72.2
Services	Use of big data in developing new products	6.7	11.8	21.3	60.2
	Use of public sector open data in developing new products	2.3	10.8	24.9	62.0
	Use of big data in improving products	6.6	11.3	23.1	59.1
	Use of public sector open data in improving products	2.2	10.5	26.5	60.8
	Use of data in developing process innovations	4.9	12.7	23.0	59.4
	Use of data in developing organisational innovations	3.5	10.2	26.2	60.1
	Use of data in developing marketing innovations	5.4	15.7	22.9	56.0
	Use of data in research and development	7.3	13.8	21.1	57.8
	Use of data in managing production process	4.9	12.0	22.2	60.9
	Use of data in marketing	6.1	21.1	22.9	49.9
	Selling big data to other enterprises	1.4	4.7	13.8	80.1
	Buying big data from other enterprises	1.8	7.8	21.0	69.4

		High importance	Medium importance	Low importance	Not relevant
		%	%	%	%
Innovation activity	Use of big data in developing new products	6.7	13.1	26.1	54.1
	Use of public sector open data in developing new products	2.2	10.5	30.7	56.7
	Use of big data in improving products	6.6	12.9	27.2	53.4
	Use of public sector open data in improving products	2.0	9.7	31.7	56.6
	Use of data in developing process innovations	6.5	16.7	29.5	47.2
	Use of data in developing organisational innovations	3.2	12.2	33.5	51.1
	Use of data in developing marketing innovations	5.5	18.7	28.5	47.3
	Use of data in research and development	8.7	19.0	26.7	45.6
	Use of data in managing production process	7.5	16.8	27.1	48.6
	Use of data in marketing	6.4	23.4	28.8	41.4
	Selling big data to other enterprises	1.2	5.8	17.5	75.4
	Buying big data from other enterprises	1.3	8.5	24.8	65.4
No innovation activity	Use of big data in developing new products	2.0	4.7	15.6	77.6
	Use of public sector open data in developing new products	1.2	6.2	16.8	75.9
	Use of big data in improving products	1.9	4.3	17.4	76.4
	Use of public sector open data in improving products	1.4	5.1	18.1	75.4
	Use of data in developing process innovations	1.3	5.1	18.6	75.0
	Use of data in developing organisational innovations	1.2	4.3	19.1	75.3
	Use of data in developing marketing innovations	1.5	5.4	19.4	73.7
	Use of data in research and development	1.7	4.8	17.8	75.6
	Use of data in managing production process	2.6	5.5	18.7	73.2
	Use of data in marketing	1.8	9.1	19.9	69.2
	Selling big data to other enterprises	0.8	2.2	11.8	85.3
	Buying big data from other enterprises	1.3	3.8	14.6	80.3

Appendix table 23. The importance of digitalisation for enterprise's business activity 2014-2016, share of enterprises

		High importance	Medium importance	Low importance	Not relevant
		%	%	%	%
All NACE - Total	Importance of digital products for enterprise's business activity	20.0	25.5	27.3	27.2
	Importance of cloud services for enterprise's business activity	16.0	27.5	33.4	23.2
	Importance of social media for enterprise's business activity	8.1	22.9	42.8	26.2
	Importance of the Internet of Things for enterprise's business activity	13.6	20.6	32.9	32.9
	Utilisation of robotics in production processes	7.6	15.2	25.9	51.4
	Importance of digitalisation in producing products	16.4	24.5	27.0	32.1
	Importance of digitalisation in designing products	9.0	14.2	28.1	48.7
	Importance of digitalisation in marketing products	16.2	28.3	26.5	29.0
	Importance of digitalisation in distributing products	13.9	25.6	29.4	31.1
Manufacturing	Importance of digital products for enterprise's business activity	9.6	22.2	36.8	31.4
	Importance of cloud services for enterprise's business activity	9.1	28.6	37.7	24.6
	Importance of social media for enterprise's business activity	5.4	20.5	45.8	28.2
	Importance of the Internet of Things for enterprise's business activity	11.0	20.6	36.7	31.6
	Utilisation of robotics in production processes	11.6	22.0	31.1	35.4
	Importance of digitalisation in producing products	8.1	24.8	36.2	30.9
	Importance of digitalisation in designing products	5.0	13.0	34.6	47.4
	Importance of digitalisation in marketing products	10.6	27.2	31.7	30.5
	Importance of digitalisation in distributing products	5.5	24.3	37.9	32.4
Services	Importance of digital products for enterprise's business activity	28.2	28.1	19.8	23.9
	Importance of cloud services for enterprise's business activity	21.3	26.6	30.0	22.1
	Importance of social media for enterprise's business activity	10.2	24.9	40.4	24.6
	Importance of the Internet of Things for enterprise's business activity	15.7	20.6	29.9	33.9
	Utilisation of robotics in production processes	4.4	9.8	21.7	64.0
	Importance of digitalisation in producing products	23.0	24.2	19.8	33.1
	Importance of digitalisation in designing products	12.1	15.1	23.0	49.8
	Importance of digitalisation in marketing products	20.6	29.1	22.4	27.9
	Importance of digitalisation in distributing products	20.6	26.6	22.7	30.1

		High importance	Medium importance	Low importance	Not relevant
		%	%	%	%
Innovation activity	Importance of digital products for enterprise's business activity	26.2	27.4	28.6	17.8
	Importance of cloud services for enterprise's business activity	21.0	30.3	33.6	15.2
	Importance of social media for enterprise's business activity	10.3	28.6	44.5	16.7
	Importance of the Internet of Things for enterprise's business activity	16.6	22.9	34.2	26.2
	Utilisation of robotics in production processes	10.6	18.2	29.2	42.0
	Importance of digitalisation in producing products	21.8	27.1	28.9	22.2
	Importance of digitalisation in designing products	12.1	17.9	31.5	38.5
	Importance of digitalisation in marketing products	22.0	33.4	26.5	18.0
	Importance of digitalisation in distributing products	18.4	29.8	31.0	20.8
No innovation activity	Importance of digital products for enterprise's business activity	8.7	21.9	24.8	44.6
	Importance of cloud services for enterprise's business activity	6.7	22.3	33.0	38.0
	Importance of social media for enterprise's business activity	4.1	12.6	39.7	43.6
	Importance of the Internet of Things for enterprise's business activity	8.2	16.4	30.3	45.1
	Utilisation of robotics in production processes	2.1	9.7	19.7	68.5
	Importance of digitalisation in producing products	6.5	19.7	23.5	50.3
	Importance of digitalisation in designing products	3.3	7.4	21.9	67.4
	Importance of digitalisation in marketing products	5.5	18.8	26.5	49.3
	Importance of digitalisation in distributing products	5.7	17.8	26.4	50.1

Appendix table 24. Results from cooperation with universities, realized or expected results by the end of 2018, importance of results, share of enterprises with cooperation with universities

Industry		High importance	Medium importance	Low importance	Not relevant
		%	%	%	%
All NACE - Total	Strengthening the knowledge base and competence	20.1	52.3	20.8	6.9
	Introduction of a new technology, method or device	14.7	31.9	35.5	17.9
	Patent (applied or granted)	3.7	11.3	31.8	53.3
	New or improved products (goods or services)	12.1	34.9	30.9	22.1
	An overview of future trends and markets	15.8	33.5	33.5	17.2
	Access to, or progress on, international markets	6.2	16.9	40.6	36.3
	Research cooperation with other universities expands	4.7	21.9	40.9	32.6
	Participation in international reserch and innovation programmes	6.4	18.6	35.2	39.8
	Other results	1.0	2.3	0.4	96.3
Manu-facturing	Strengthening the knowledge base and competence	20.8	52.5	21.5	5.2
	Introduction of a new technology, method or device	16.0	33.2	34.5	16.2
	Patent (applied or granted)	4.6	10.8	35.9	48.7
	New or improved products (goods or services)	10.8	37.0	34.0	18.3
	An overview of future trends and markets	13.7	30.0	37.9	18.4
	Access to, or progress on, international markets	4.4	16.5	40.8	38.3
	Research cooperation with other universities expands	4.3	21.4	41.7	32.6
	Participation in international reserch and innovation programmes	5.7	19.1	36.9	38.3
	Other results	0.9	2.5	0.1	96.5
Services	Strengthening the knowledge base and competence	19.1	52.1	19.9	8.9
	Introduction of a new technology, method or device	13.0	30.3	36.8	20.0
	Patent (applied or granted)	2.4	11.8	26.8	59.0
	New or improved products (goods or services)	13.7	32.3	27.1	26.9
	An overview of future trends and markets	18.5	38.0	27.9	15.6
	Access to, or progress on, international markets	8.4	17.5	40.4	33.7
	Research cooperation with other universities expands	5.2	22.5	39.8	32.5
	Participation in international reserch and innovation programmes	7.2	18.1	33.0	41.7
	Other results	1.2	1.9	0.8	96.1

Appendix table 25. Changes in the forms and meaning of university cooperation in 2014-2016 compared to before, share of enterprises with cooperation with universities

Industry		Importance increased	Importance stayed unchanged	Importance decreased	No cooperation
		%	%	%	%
All NACE - Total	Contracted out RD	13.4	39.2	8.5	38.9
	Innovation-oriented joint development	15.3	49.9	6.4	28.4
	Growth in education cooperation (university researchers in enter-prises)	8.6	38.5	6.9	45.9
	The enterprise has used universities' research and laboratory infrastructure and services	11.6	41.0	10.2	37.2
	Demo, piloting and product testing	9.9	36.5	11.4	42.2
	Theses	16.8	56.6	9.0	17.7
	Recruitment of new experts from universities to the enterprise	17.6	45.9	8.2	28.3
	Other changes	2.3	0.5	0.2	97.0
Manu-facturing	Contracted out RD	14.8	48.4	9.8	27.0
	Innovation-oriented joint development	14.5	54.7	8.1	22.6
	Growth in education cooperation (university researchers in enter-prises)	6.8	41.3	7.0	44.9
	The enterprise has used universities' research and laboratory infrastructure and services	15.5	44.4	12.1	28.1
	Demo, piloting and product testing	12.1	40.7	12.3	34.9
	Theses	15.8	56.5	9.7	18.1
	Recruitment of new experts from universities to the enterprise	10.5	48.9	9.0	31.6
	Other changes	1.8	0.9	0.2	97.0
Services	Contracted out RD	11.7	27.7	6.8	53.8
	Innovation-oriented joint development	16.4	43.8	4.3	35.5
	Growth in education cooperation (university researchers in enter-prises)	10.8	35.1	6.9	47.2
	The enterprise has used universities' research and laboratory infrastructure and services	6.9	36.7	7.9	48.5
	Demo, piloting and product testing	7.3	31.3	10.1	51.3
	Theses	18.0	56.7	8.2	17.1
	Recruitment of new experts from universities to the enterprise	26.5	42.2	7.2	24.1
	Other changes	2.9	0.0	0.1	97.0

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