Innovation 2018

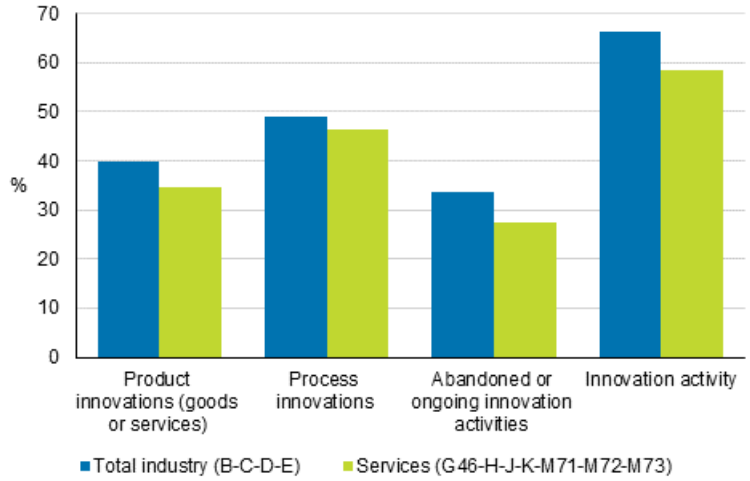
Innovation expenditure grew in 2018 from two years ago

Over 60 per cent of enterprises employing at least 10 persons were involved in innovation activity in 2016 to 2018. Good one-third of enterprises introduced new or improved products to the market and nearly one half renewed their business processes. Compared with the previous survey of two years ago, EUR 760 million more innovation expenditure was now reported. The data appear from the statistics on enterprises' innovation published by Statistics Finland.

Enterprises' innovation activity is still, particularly as concerns product development, more common in manufacturing enterprises than in service industries. Forty per cent of manufacturing enterprises made product innovations in 2016 to 2018 and 34 per cent of enterprises in service industries introduced new or improved products to the market.

Processes related to business activities were renewed by nearly an equal share of manufacturing and service enterprises. Renewal of production processes is more common in manufacturing than in service industries. For other business functions, activity was renewed almost as generally – with regard to information technology and administration systems and business practices and external relations slightly more often in service industries than in manufacturing.

Prevalence of innovation activity in manufacturing (B-C-D-E) and services (G46-H-J-K-M71-M72-M73) in 2016 to 2018, share of enterprises



Around two-thirds of the combined turnover of the surveyed enterprises were generated in 2018 in enterprises that had had product innovations in 2016 to 2018. In 2018, the turnover derived from product innovations represented altogether 22 per cent of the turnover of those having reported product innovations. This is 14 per cent of the combined turnover of all enterprises in the survey.

A total of EUR 760 million more innovation expenditure was recorded in 2018 than in the previous survey in 2016. Expenditure amounted to nearly EUR 6.8 billion. Growth was mostly recorded in enterprises located in service industries. The majority, 66 per cent, of innovation expenditure reported in Finland was generated from research and development. In Finland enterprises reported fairly little expenditure on other innovation activity. Although innovation expenditure grew mainly in service industries, over one-half, 58 per cent of expenditure in 2018 was generated in manufacturing, where innovation expenditure totalled EUR 3.9 billion. Thus, the share of service industries was 42 per cent and EUR 2.9 billion.

Twenty-nine per cent of those with innovation activity used public financial support for financing innovation activity. The most common form of support was government financial support. Financing obtained through equity finance was used for research and development or other innovation activity by one-tenth of those with innovation activity and debt finance was also directed to innovation activity by around 10 per cent of those with innovation activity.

Data protection legislation is challenging from the viewpoint of innovation activity. Of the sub-areas of legislation presented in the inquiry it was assessed clearly most often as having an effect on innovation activity, above all as a factor hampering innovation activity.

Lack of skilled employees in the enterprise and different priorities within the enterprise as well as too high costs were found to be the most essential of the factors hampering actual innovation activity. Over 40 per cent of those with innovation activity assessed lack of skilled employees at least a medium high factor hampering innovation activity.

The inquiry examining innovation activity inquired about enterprises' development potentials more widely from enterprises that did not have innovation activity in the reference period of the survey. There were features promoting renewal in enterprises even if the activity was not realised in the reference period into work aiming at innovations. For example, nearly 30 per cent of enterprises that did not report innovation activity in 2016 to 2018 acquired technical services and over one third renewed their stock of machinery, equipment and software.

Contents

Tables

Figures

1. Enterprises' innovation activity in Finland

EU-harmonised statistics on innovation describe the innovation activity of enterprises employing at least ten persons and enterprises' general development potential and the related operating environment. The most recent reference period of the statistics covers the years 2016 to 2018.

The content of the survey was renewed from before, when surveys were more limited only to innovation activity. Previous results are available from the releases and archive database.

Further information about the survey and its implementation http://stat.fi/til/inn/index_en.html

Due to the extensive data, results can only be described in this report on a less detailed level, whereby the observations based on aggregated results do not necessarily describe the situation of a more detailed level, such as an individual industry. Industry-specific and size category-specific data can be found in tables in Statistics Finland's statistical databases.

2. Abstract of enterprises' innovation activity in 2016 to 2018

Of the surveyed enterprises, 62 per cent were involved in innovation activity in the reference period 2016 to 2018. The share of enterprises with innovation activity was good one-half of enterprises in earlier surveys, around five to ten years ago. The share has grown since, and now in the latest two surveys it has climbed over 60 per cent, showing that an ever larger part of Finnish enterprises develop their products or processes.

Thirty-seven per cent of enterprises introduced new or improved products to the market. In addition, enterprises most often develop their products themselves. Two-thirds of enterprises with product innovations introduced products new to the market. Enterprises having reported product innovations generated good one-fifth of their total turnover from product innovations. This made up 14 per cent of the combined turnover of all enterprises in the survey.

A bigger share of enterprises develop process innovations than products. In 2016 to 2018, nearly one-half, 48 per cent of enterprises made innovations related to business processes. As in the case of product innovations, a significant share of process innovators also develop processes themselves.

Over one-half of innovating enterprises reported that expectations set for product and process innovations had already been met during the survey period. However, it often takes time to realise the results, and the results of innovations will be visible only in the longer term.

Enterprises' innovation expenditure has grown from the previous measuring period, and EUR 6.8 billion were recorded for 2018, growing by around EUR 760 million from expenditure two years earlier. The majority of expenditure was research and development expenditure. The share of enterprises operating in manufacturing was 58 per cent of innovation expenditure, although the most significant increase was generated from R&D expenditure in service industries. Reporting of other innovation expenditure than R&D expenditure is very low relative to enterprises' investments. It can be assumed that expenditure is not in this respect described fully in the statistics.

In all, 12 per cent of enterprises with innovation activity had equity finance in 2016 to 2018, and three out of four of those having received financing used it on R&D or other innovation activity. Every fifth enterprise with innovation activity received debt finance, and around every second of those having received financing and had had innovation activity used financing for innovation activity as well.

Thirty-seven per cent of those with innovation activity received public financial support. The share of those having received support was higher in manufacturing than in service industries. The most common form of support is government financial support, which covers the support of Business Finland, for example.

As in previous years, innovation cooperation was most common with equipment and material suppliers, consultants and private research laboratories and enterprise customers. Universities are also important cooperation partners in developing new, and enterprises belonging groups naturally innovate together with other enterprises in the group.

The data protection legislation has an effect on enterprises' innovation activity, because in addition to some enterprises estimating it has generated and enabled innovation activity, it most of all appears to many enterprises as a factor preventing or hampering innovation activity.

The most common factor hampering innovation activity is lack of skilled personnel in enterprises. This concerns enterprises of all sizes. In large enterprises, different priorities within the enterprise are particular challenges for starting and executing innovation activity.

Manufacturing enterprises protected, such as patented, more often than service enterprises, but service enterprises had more other activities related to intellectual property rights, although formal protection measures and activities related to other intellectual property rights concern only a limited group of enterprises. In acquisition of knowledge manufacturing enterprises use more often than enterprises in service industries the information included in patents or standardisation information, while service industries use more commonly Internet channels and open platforms than manufacturing enterprises.

In the light of the survey results, the utilisation of data in enterprises' business has become more common from the previous survey. The most important application targets of digitalisation were digital products and cloud services in 2016 to 2018.

The most common results of enterprises' cooperation with research organisations were in 2016 to 2018 an overview of trends and markets, introduction of a new technology, method or equipment and product development. The most common forms of cooperation, that is, students' internships and graduation theses and recruitments also strengthened further according to the views of enterprises.

3. Of the surveyed enterprises, 62 per cent were involved in innovation activity in 2016 to 2018

Sixty-two per cent of the enterprises in the Innovation Survey reported that they had had innovation activity in 2016 to 2018. Over one-third of enterprises, 37 per cent, reported introduction of product innovations to the market, and an even bigger share, 48 per cent of enterprises had implemented innovations related to their business processes during the three-year survey period.

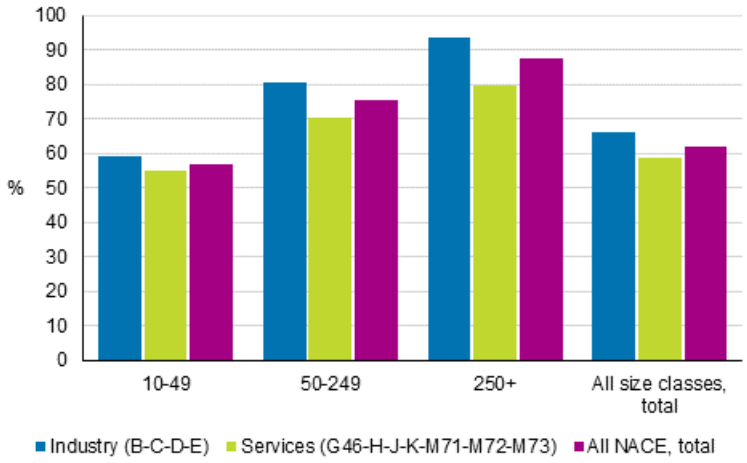
The share of enterprises with innovation activity has grown in recent years, because the share has climbed up to over 60 per cent in the latest two surveys. In earlier surveys good one-half of the surveyed enterprises reported having had innovation activity.

An enterprise is considered to be an enterprise involved in innovation activity if it has had innovations in the survey period, that is, it has introduced to the market or adopted new or improved products or processes or it has had activity aiming at their introduction.

Innovation activity has become more general in all size categories, but particularly among medium-size enterprises in the survey, or those employing 50 to 249 persons. In previous surveys good 60 per cent of enterprises in this size category reported innovation activity, in the latest two surveys the share of enterprises with innovation activity had exceeded 75 per cent among medium-size enterprises.

As in previous surveys, innovation activity was more common in manufacturing than in services in 2016 to 2018. In manufacturing 66 per cent of enterprises had innovation activity and in services 59 per cent. Examined by size category, the situation has remained unchanged, because among large enterprises innovation is still more general than in small enterprises.

Figure 1. Prevalence of innovation activity in total industry and service industries by enterprise size category in 2016 to 2018, share of enterprises



Among manufacturing industries, innovation activity was most widespread in 2016 to 2018 in the pharmaceutical industry (C21), in the textile and clothing industry (C13-14), in the manufacture of computers, electronic and optical products (C26), in the paper industry (C17), and in the manufacture of rubber and plastic products (C22). In the beverage industry (C11), as well as in the manufacture of electronic equipment (C27) and in the manufacture of machinery and equipment n.e.c. (C28) around 80 per cent of enterprises reported innovation activity. The most commonly innovating branches thus represented both small and bigger industries by number of enterprises.

In service industries innovation activity was most widespread in computer programming (J62), research and development (M72) and information service activities (J63).

Examined by number, among individual industries most innovating enterprises were found in wholesale trade (G46), computer programming (J62), architectural and engineering activities (M71 architectural and

engineering activities; technical testing and analysis), manufacture of fabricated metal products (C25 manufacture of fabricated metal products, except machinery and equipment), the manufacture of machinery and equipment n.e.c. (C28) and the manufacture of food products (C10).

The majority of enterprises with innovation activity reported innovations during 2016 to 2018, that is, either new or improved products, that had been introduced to the market, or new or improved business processes that were implemented in the survey period. Fifty-six per cent of enterprises reported innovations, that is, 90 per cent of all enterprises with innovation activity.

Nearly one-third of enterprises reported ongoing projects at the end of the survey period aiming to accomplish innovations but that were not yet completed. Every tenth enterprise reported abandoned innovation projects during the survey period.

Forty-one per cent of enterprises were involved in research and development (R&D), which is in full counted in innovation activity. Around every fourth enterprise reported regular research and development, while 17 per cent said they had had practised R&D irregularly. About every fourth enterprise said they had contracted out R&D to other enterprises or organisations. However, research and development are seldom contracted out without the enterprise making its own research and development as well. The share of enterprises with own R&D or that contracted out R&D to others was in all 44 per cent of all enterprises and 70 per cent of enterprises with innovation activity.

The shares of enterprises having had or contracted out R&D are both in manufacturing and services now several percentage points higher than in the surveys between 2006 and 2014. Research and development have become more general precisely as regular own R&D has become more widespread and above all in service industries.

Further information about the generality of innovation activity by industry and size category

Enterprises' innovation activity by industry group and enterprise size category

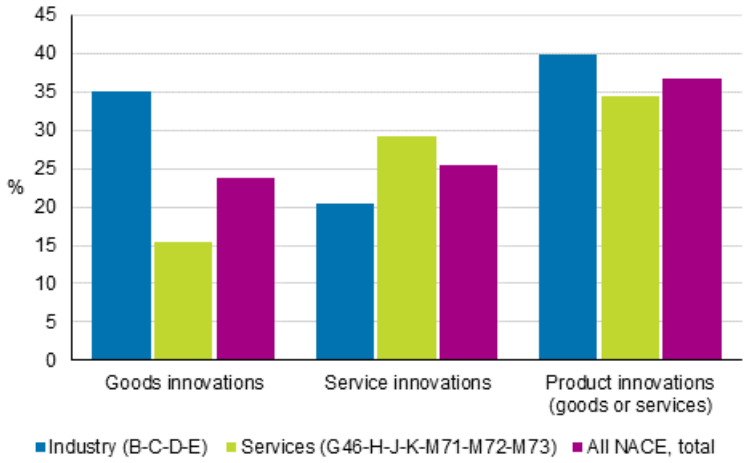
Enterprises' innovation activity by industry

4. Share of enterprises having introduced service innovations to the market has reached the share of those having launched goods innovations

Of manufacturing enterprises, 40 per cent introduced product innovations, that is, goods innovations or service innovations to the market in 2016 to 2018. In the surveyed service industries the share was 34 per cent. Calculated from all enterprises, more than every third, 37 per cent, reported product innovations.

Of the smallest enterprises surveyed nearly one third launched product innovations on the market, one-half of medium-size enterprises and 71 per cent of the largest enterprises.

Figure 2. Prevalence of goods and service innovations in total industry and services in 2016 to 2018, share of enterprises



The share of enterprises having introduced new or improved products to the market among enterprises in the industry was highest in the manufacture of computers, electronic and optical products (C26), where 81 per cent of enterprises reported product innovations. In service industries, the share was highest in computer programming (J62 Computer programming, consultancy and related activities), where the share of product innovators was 63 per cent of enterprises.

Earlier enterprises reported more generally goods innovations than service innovations, but the share of enterprises having made service innovations has risen in the latest two Innovation Surveys at least as high as the share of enterprises reporting goods innovations. Every fourth enterprise introduced service innovations to the market in 2016 to 2018, the share of those having introduced goods innovations was 24 per cent.

The introduction of goods and service innovations to the market was almost as common in different size categories. Of the smallest size category enterprises in the survey, 20 per cent reported goods innovations and 21 per cent service innovations. Of medium-size enterprises, 33 per cent introduced goods innovations and a slightly bigger share, 36 per cent service innovations. Among the biggest enterprises the introduction of service innovations to the market was slightly more common than goods innovations. Goods innovations were reported by 52 per cent and service innovations by 55 per cent of enterprises in the biggest size category.

Further information about the generality of product innovations by industry and size category

Enterprises' innovation activity by industry group and enterprise size category

Enterprises' innovation activity by industry

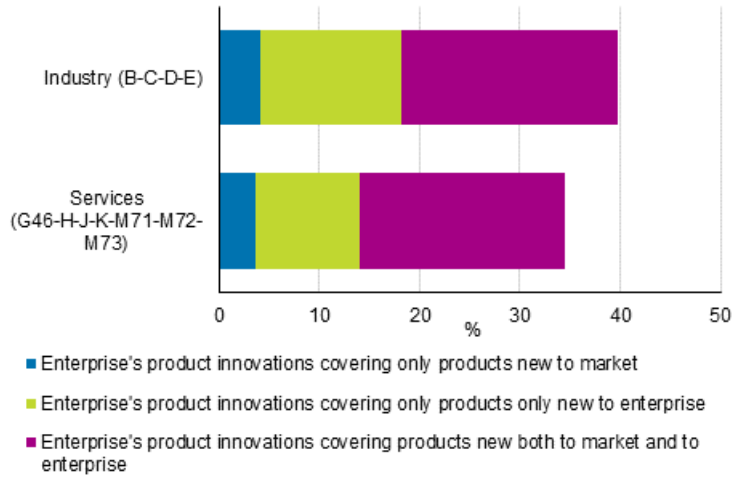
5. Majority of those having innovated products renew their product selection from the perspective of both their enterprise and market

The majority, nearly 90 per cent of those having innovated products said they had introduced to the market such products that are new to their enterprise but similar to those already on the enterprise's market. This is nearly one-third of all surveyed enterprises.

Slightly fewer, 67 per cent, of those having innovated products reported introducing such product innovations to the market that were also new to their market. Those having launched products new to the market represented one-quarter of all enterprises.

The prevalence of innovation of products with different novelty values is generally very similar in manufacturing and service industries. An enterprise innovating products often introduces to the market both product innovations that are new only to the enterprise and new or improved products that are also new to the enterprise's market.

Figure 3. Prevalence of product innovations and introduction of new or improved products to the market by novelty value in total industry and services in 2016 to 2018, share of all enterprises

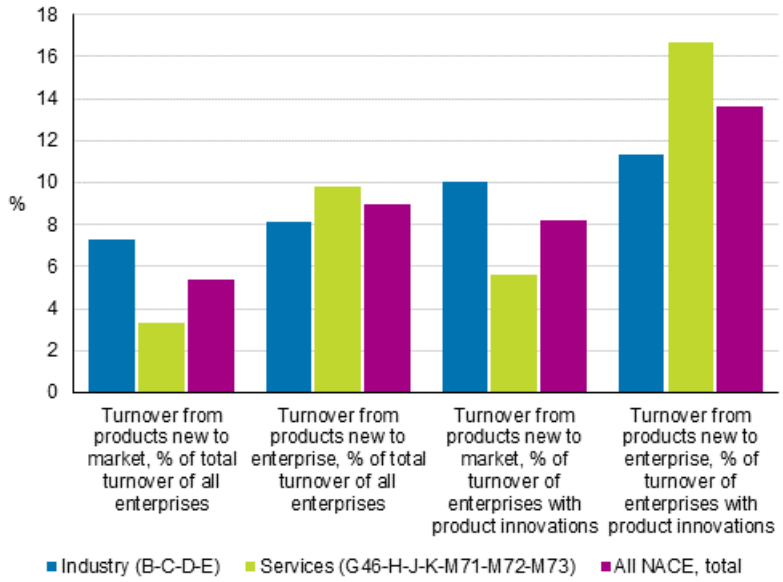


The combined turnover of enterprises having introduced product innovations to the market in 2016 to 2018 was in manufacturing 72 per cent of the combined turnover of all enterprises in the survey in 2018. In service industries the corresponding share was 58 per cent. Two out of three turnover euros of the surveyed enterprises were thus generated in 2018 in enterprises that made product innovations.

Fourteen per cent of the turnover of those having introduced product innovations to the market – and nine per cent of the combined turnover of all enterprises in the survey – was generated in 2018 from such product innovations introduced to the market in 2016 to 2018 that were new to the enterprises having produced them.

Eight per cent of the turnover of enterprises having introduced product innovations to the market – and five per cent of the combined turnover of all enterprises in the survey – generated in 2018 instead from such product innovations introduced to the market in 2016 to 2018 that were new to the market of the enterprises having produced them.

Figure 4. Share of turnover in 2018 from new or improved products introduced to the market in 2016 to 2018



Of those having launched new or improved products on the market, 78 per cent reported their enterprise had developed product innovations. Over one-half of those having innovated, 56 per cent, had developed product innovations together with other enterprises or organisations. Every fourth of innovators had adapted or modified products originally developed by other enterprises or organisations, and 13 per cent had introduced products to the market that were developed by other enterprises or organisations. In service industries the enterprise developed product innovations itself slightly less often than in manufacturing industries, and innovations were based in service industries more commonly than in manufacturing on products produced by others.

The majority of those having introduced new or improved products to the market in 2016 to 2018 assessed that innovations had met the expectations set for them at least to some extent. Nearly one half, 48 per cent of those having innovated products assessed that expectations connected to innovations had been met by the end of the survey period. Every tenth considered expectations had been exceeded. In all, 30 per cent of innovators felt expectations had been met only to some extent by the end of 2018. Four per cent assessed that expectations had not been met and eight per cent felt that it was too early to assess whether expectations had been met in the survey period.

Further information about product innovations and turnover derived from them by industry and size category

Enterprises' innovation activity by industry group and enterprise size category

Enterprises' innovation activity by industry

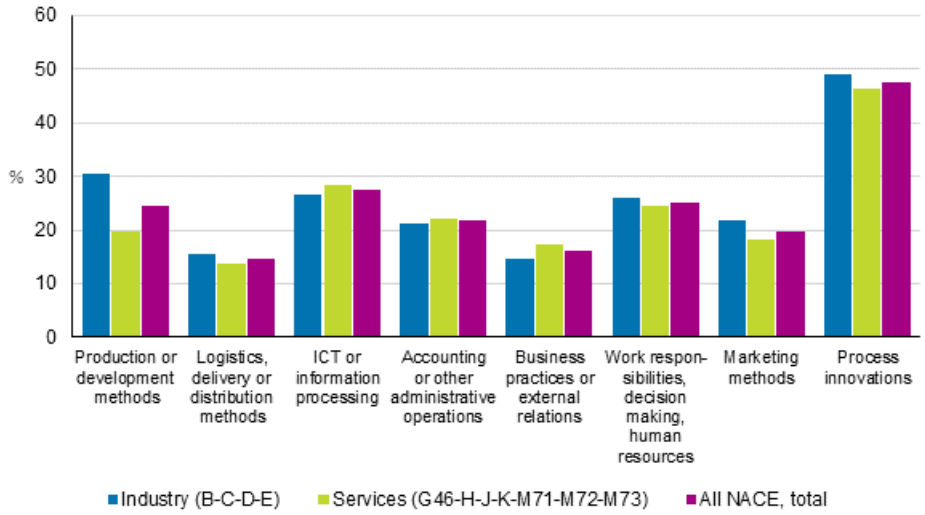
Enterprises' innovation expenditure and turnover derived from innovations by industry

6. Innovations related to business processes aim at developing production methods, methods for information technology and data processing and work responsibility and decision making

Nearly one-half of the surveyed enterprises had introduced new or improved process innovations related to different sections of the enterprise's business activity in 2016 to 2018. The introduction of process innovations was just slightly more common in manufacturing than in services.

Process innovations were more commonly directed to the methods for information and communication technology or data processing, or organising work responsibility, decision making or human resource management and production and methods for producing and developing goods and services. Process innovations were directed to different business processes similarly in manufacturing and services except for renewal of production methods, which was more common in manufacturing than in services.

Figure 5. Prevalence of process innovations implemented by enterprises in total industry and services in 2016 to 2018, share of enterprises



Development of production methods was reported most often in the manufacture of computers, electronic and optical products, which enterprises also reported quite generally other kinds of process innovations. Of the biggest fields by the number of enterprises, nearly every fourth enterprise in the manufacture of metal products (C25) had implemented new or improved production methods, every tenth had renewed logistics, delivery and distribution methods and around every fifth had introduced methods for information processing and communication or data processing that differed significantly from the methods previously used by the enterprise. In wholesale trade (G46) every fourth enterprise had developed logistics, delivery and distribution methods and at least equally many reported innovations directed to methods for information processing and communication or data processing and to organising work responsibility, decision making or human resource management.

As the introduction of product innovations to the market, the introduction of process innovations is also more common in large enterprises than in small ones. Process development is clearly more common than product development work in the smallest size category of the survey, enterprises employing 10 to 49 persons, and in medium-size service enterprises employing 50 to 249 persons.

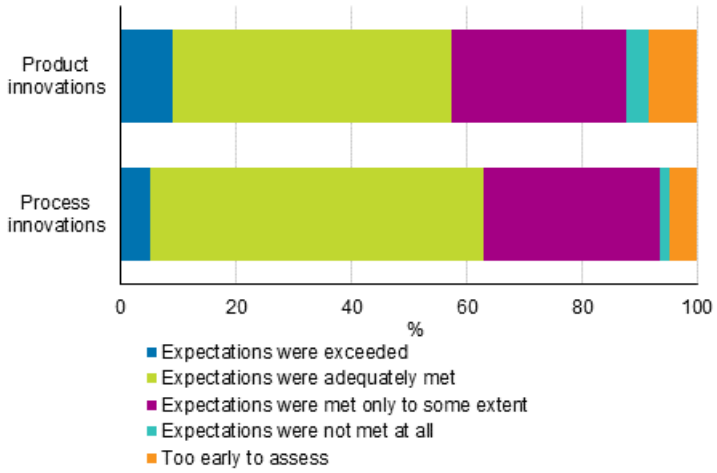
Two-thirds of enterprises having implemented process innovations had developed new or improved processes in-house by the enterprise. Good one-half of innovators had developed the enterprise's business processes together with other enterprises or organisations. One fifth had innovated processes by adapting

or modifying processes originally developed by others and nearly one fifth had introduced new or improved processes that were developed by other enterprises or organisations.

The majority of those having renewed their business processes in 2016 to 2018 considered expectations related to innovation had been met at least to some extent. Five per cent of innovators thought expectations had been exceeded, and 58 per cent assessed they had been met. Nearly one third, 31 per cent thought expectations had been met to some extent. A few per cent assessed that expectations set for the innovations had not been met, and five per cent felt that it was too early to assess the success of innovations and meeting expectations in the implementation stage of the research.

In practice, over one-half of those reporting product or process innovations thus felt that expectations related to innovations had been met during the survey period. Nearly one third considered the expectations had been met to some extent by the end of the survey period, and a few per cent assessed that expectations had not been met. The effects of innovations may often be realised only after a long time and particularly innovations introduced towards the end of the survey period have perhaps not had time to turn into results, so in all respects the effects of innovations cannot yet be assessed during the survey period.

Figure 6. Realisation of expectations connected to product and process innovations introduced in 2016 to 2018 by the end of 2018, shares of those having introduced innovations



Further information about process innovations by industry and size category

Enterprises' innovation activity by industry group and enterprise size category

Enterprises' innovation activity by industry

7. Innovation expenditure increased compared to the situation two years ago

Innovation expenditure reported by enterprises totalled near to EUR 6.8 billion in 2018. Growth from the previous survey was nearly EUR 760 million. Growth came from near to service industries, where particularly expenditure on R&D performed in-house increased significantly compared to the previous survey. In service industries, innovation expenditure amounted to nearly EUR 2.9 billion, while in the previous time good EUR one billion less were reported, around EUR 1.7 billion. The share of in-house and contracted out R&D was 68 per cent of innovation expenditure in service industries in 2018.

In manufacturing innovation expenditure went down in 2018 compared to the previous survey, being now EUR 3.9 billion. Although expenditure on in-house and contracted out R&D grew from the previous time, that is, the survey period 2014 to 2016, enterprises now reported other innovation expenditure less than in the previous time. The share of expenditure on in-house and contracted out R&D of all innovation expenditure was 83 per cent.

The definition of other innovation expenditure than R&D items is very difficult, because specifying items of innovation activity from other activity is hard and laborious because of lack of precise accounting data. For that reason, the image given particularly by other innovation expenditure of inputs into innovation activity should be viewed with reservations. In comparison to enterprises' investment data, innovation investments, for example, are reported very little in Finland.

Figure 7. Innovation expenditure in total industry (B-C-D-E) in 2018, EUR million

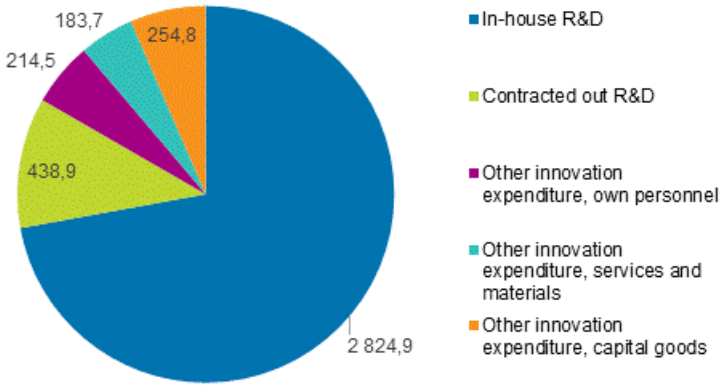
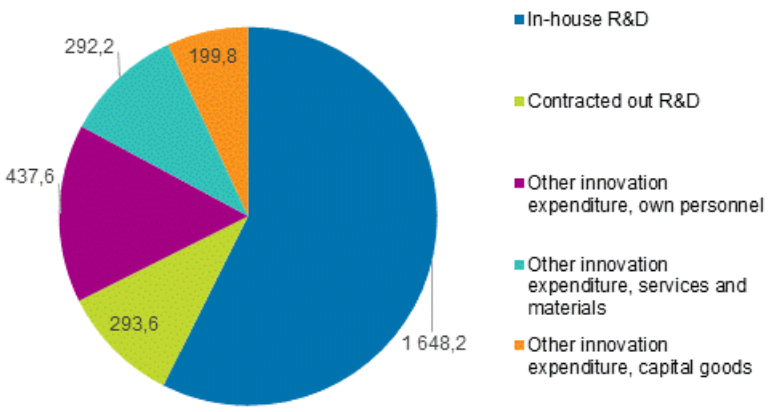


Figure 8. Innovation expenditure in services (G46-H-J-K-M71-M72-M73) in 2018, EUR million



Of industries, research and development expenditure, as well as innovation expenditure in general was recorded in 2018 most in the manufacture of computers, electronic and optical products, and of electrical equipment (C26-C27), EUR 1.7 billion, in computer programming (J62), close on EUR 1.1 billion and in the manufacture of machinery and equipment n.e.c. (C28), around EUR 800 million.

Further information about enterprises' innovation expenditure by industry

Enterprises' innovation expenditure and turnover derived from innovations by industry

8. Public financial support a more general method of funding than debt and equity finance in innovation activity

Enterprises engaged in innovation activity applied for and obtained both equity and debt finance more commonly than non-innovating enterprises in 2016 to 2018. The majority of enterprises with innovation activity having applied for equity finance had used it for development activity. In contrast, only around one-half of those with innovation activity having acquired debt finance had used the financing obtained for research and development or other innovation activity.

Every fifth enterprise in the survey applied for and obtained equity or debt finance in 2016 to 2018. Funding was applied for and obtained by every fourth enterprise having reported innovation activity. The share of those having applied for and obtained funding was slightly over 10 per cent for enterprises that did not have innovation activity in the survey period.

On the general level, acquisition of financing was as general in various size categories, but manufacturing enterprises in the biggest size category applied for financing the least often, while in service industries the smallest share of finance applicants was among medium-size enterprises.

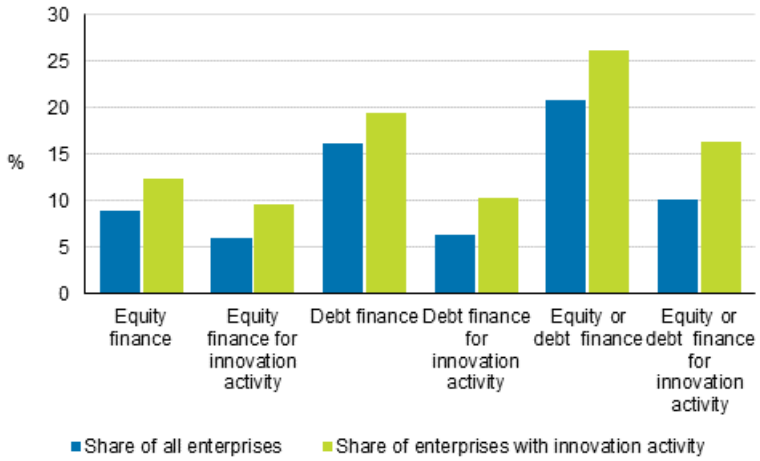
Equity finance was obtained by nine per cent of all enterprises in the survey – 12 per cent of those with innovation activity and three per cent of non-innovators. The share of those funding their activity with equity finance was the same in manufacturing and service industries.

Every tenth enterprise with innovation activity used equity finance for research and development or other innovation activity.

In 2016 to 2018, in all 16 per cent of all enterprises in the Innovation Survey received debt finance – 19 per cent of those with innovation activity and 11 per cent of non-innovating enterprises. Debt finance was used more generally in manufacturing than in service industries, the share of those having received debt finance was 21 per cent in manufacturing and 13 per cent in service industries.

As with equity finance, around every tenth enterprise with innovation activity used it for its development activity.

Figure 9. Enterprises having received equity or debt finance and use of funding on research and development or other innovation activity in 2016 to 2018



Public financial support was received by every fourth enterprise in the survey in 2016 to 2018, and 18 per cent used the received financial support – either fully or partly – on research and development or other innovation activity.

The share of enterprises with innovation activity having received public financial support was nearly one third, 37 per cent, and the share of those having used public financial support on innovation activity was

29 per cent. Five per cent of enterprises with no innovation activity received public financial support for their activity.

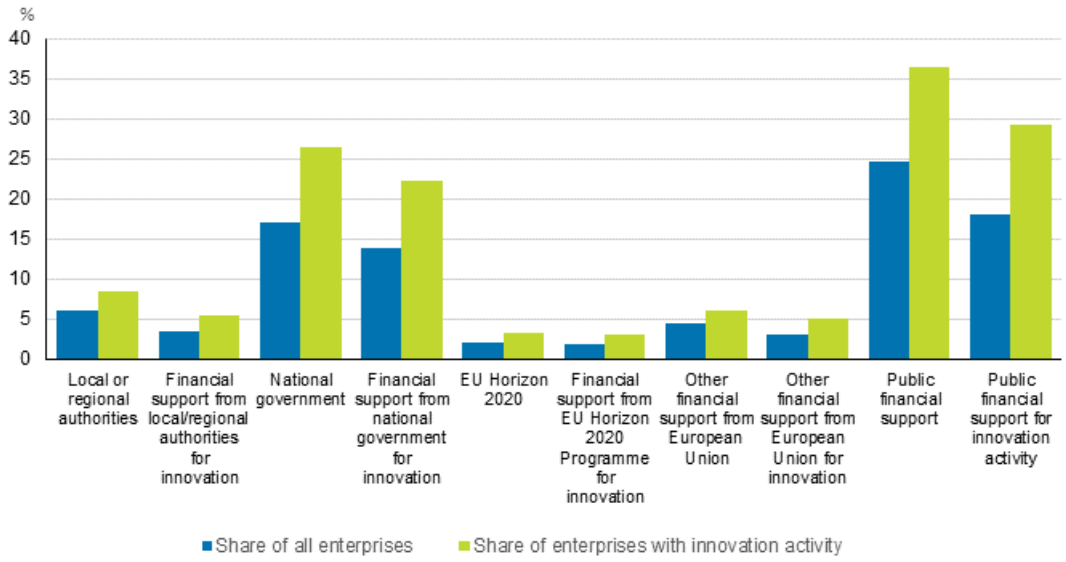
Clearly a bigger part of manufacturing enterprises than service enterprises received public financial support. In manufacturing, 34 per cent had received support and in service industries 17 per cent. Nearly one-quarter of manufacturing enterprises, 24 per cent, used public financial support for innovation activity, in service industries this share was ten percentage points lower, 14 per cent.

Examined by size category, public financial support became more widespread in 2016 to 2018 as in previous years as the enterprise's size category grew. Support was received by 22 per cent of the smallest enterprises in the survey and by 44 per cent of the biggest ones. Financing was used on innovation by 27 per cent of the smallest size category enterprises with innovation activity. The corresponding share was 48 per cent in the biggest size category.

Public financial support was mostly channelled to enterprises through government financing, such as from Business Finland. Of all enterprises, the share of those having received government financing in 2016 to 2018 was 17 per cent, and around every fourth of those with innovation activity received government financing. The majority of those having received financing used it on innovation activity.

Six per cent of all enterprises in the survey and nine per cent of enterprises with innovation activity received financing from local and regional authorities in 2016 to 2018. Financing was received from the EU Horizon 2020 Programme for Research and Innovation by a few per cent of all enterprises and three per cent of enterprises with innovation activity, and most of them also used the financing for innovation activity. Other financing from the European Union was received by about five per cent of enterprises, which was six per cent of those with innovation activity. Some of that was also directed to financing innovation activity.

Figure 10. Enterprises having received public financial support and use of financing on research and development or other innovation activity in 2016 to 2018



Further information about financing and public support on innovation activity by industry and size category

Financing and public support and their use on innovation activity by industry group and enterprise size category

Financing and public support and their use on innovation activity by industry

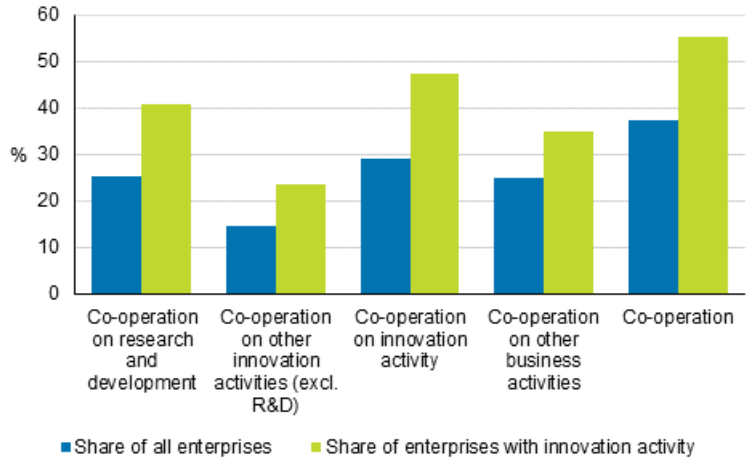
9. Cooperation is characteristic of enterprises engaged in innovation activity

Of all enterprises included in the Innovation Survey, every third reported cooperation with other enterprises or organisations during the three-year survey period 2016 to 2018. Over one-half of enterprises with innovation activity, 55 per cent, reported cooperation. A significantly smaller share of enterprises with no innovation activity reported cooperation, eight per cent. Then cooperation was directed to other business than innovation activity.

Forty-one per cent of enterprises with innovation activity and every fourth enterprise calculated from all enterprises had collaboration related to research and development. Nearly every fourth enterprise with innovation activity and 15 per cent of all enterprises had cooperation connected to other innovation activity. Other cooperation than that connected to innovation activity was reported by every fourth of all enterprises and 35 per cent of those with innovation activity.

Collaboration related to research and development was more common in manufacturing than in service industries, but other cooperation connected to innovation activity, similarly as cooperation related to other business activities was on the total level almost as common in manufacturing and service industries.

Figure 11. Cooperation connected to innovation activity and other business activities in 2016 to 2018



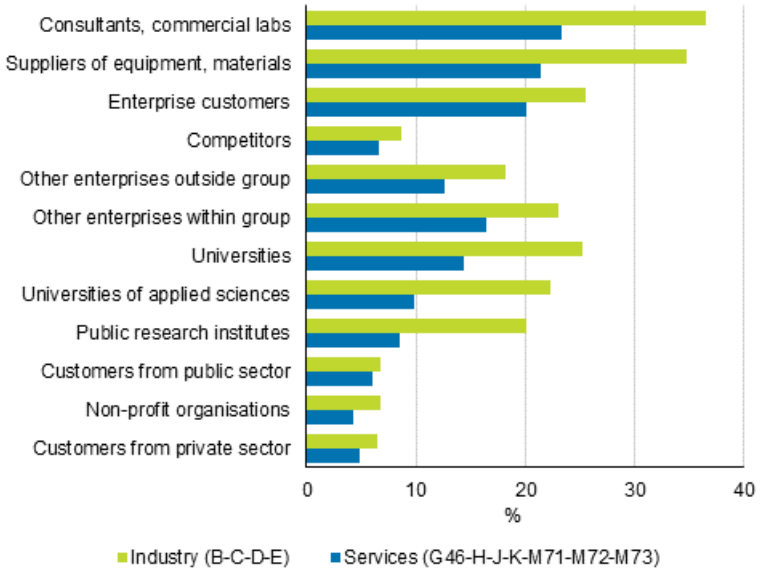
Nearly one-half of enterprises with innovation activity, being 62 per cent of all enterprises in the data, had cooperation connected to innovation activity with other enterprises or organisations in 2016 to 2018. Cooperation was most commonly reported with consultants and research laboratories, equipment and material suppliers, enterprise customers and universities. For enterprises in groups, cooperation within the group is naturally important.

Nearly half of those having cooperated reported collaboration with enterprise customers. Instead, the role of public sector customers or household customers as cooperation partners is less common.

Around one-half of those having cooperated reported innovation collaboration with universities and universities of applied sciences. Cooperation related to innovations was slightly more common with universities than with universities of applied sciences. Forty-one per cent of cooperating enterprises reported cooperation with universities, 33 per cent with universities of applied sciences.

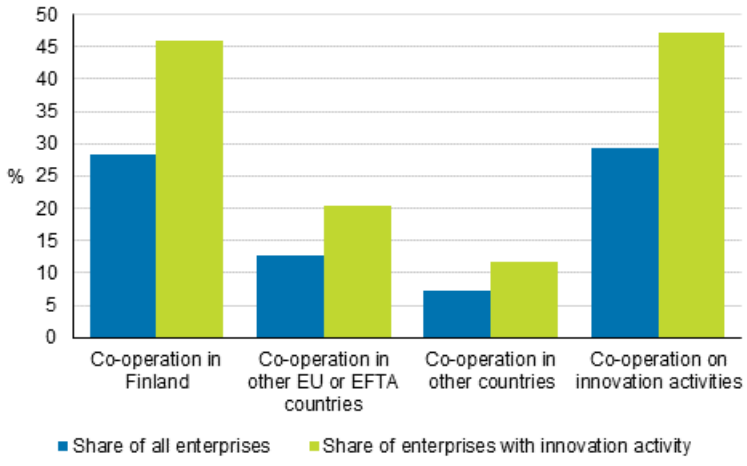
Cooperation in innovation activity is more general for manufacturing enterprises than for service industries. Over one-half of enterprises with innovation activity in manufacturing reported innovation cooperation. In services the respective share was 43 per cent. Of different cooperation partners, consultants and research laboratories and equipment and material suppliers, as well as the university sector and public research institutes are named by manufacturing enterprises significantly more often as cooperation partners in development work than by service enterprises.

Figure 12. Prevalence of cooperation in innovation activity with different cooperation partners in total industry and services in 2016 to 2018, share of enterprises with innovation activity



Nearly all of those having cooperated in innovation activity had collaborated with partners located in Finland. More than every fourth, 28 per cent, had cooperated in innovation activity with domestic partners, examined from all enterprises in the survey. Forty-three per cent of those having cooperated reported innovation cooperation with partners in EU or EFTA countries[1)], and 13 per cent of all enterprises. Every fourth of those having cooperated had cooperation partners outside EU or EFTA countries, that is, seven per cent of all enterprises.

Figure 13. Prevalence of innovation cooperation with partners located in different areas in 2016 to 2018



The most common cooperation partners for manufacturing in the EU-EFTA area were equipment and material suppliers, consultants and commercial research laboratories and enterprise customers. Service industries most often mentioned equipment and material suppliers as their partners. Enterprises within the same enterprise group are naturally among the most important partners in the EU-EFTA area and elsewhere in the world. Outside the EU and EFTA countries, partners outside the enterprise group were also most often equipment and material suppliers as well as enterprise customers.

1) European Union (EU) Member States: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland France, Germany, Greece, Hungary, Italy, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Spain, Sweden and the United Kingdom EFTA countries: Iceland, Liechtenstein, Norway, Switzerlan

For example, 12 per cent of enterprises with innovation activity in manufacturing had cooperated in 2016 to 2018 with consultants, commercial laboratories or private research institutions in the EU-EFTA area. The corresponding share was four per cent in service industries. In manufacturing industries, cooperation with consultants and laboratories, as well as cooperation with enterprise customers in the EU-EFTA area was reported most commonly by the manufacture of coke and refined petroleum products and chemical and chemical products (C19-20) and the manufacture of computer, electronic and optical products (C26).

The share of those having cooperated with equipment, material, component or software suppliers in the EU-EFTA area was 16 per cent of manufacturing enterprises with innovation activity, while the share was eight per cent in service industries. For example, 28 per cent of enterprises with innovation activity in the manufacture of paper and paper products (C17) had had cooperation with equipment and material suppliers in the EU-EFTA area in 2016 to 2018. Every tenth enterprise with innovation activity in the paper industry had development cooperation with partners outside EU-EFTA countries.

manufacturing enterprises having cooperated in Finland with the university sector operated most often in the manufacture of basic metals (C24) and in the manufacture of computers, electronic and optical products (C26). Every tenth enterprise in these fields took part in innovation cooperation with universities in EU-EFTA countries. Enterprises also had university cooperation located wider than this.

In service industries university cooperation was most common in scientific research and development (M72). Nearly one half of enterprises with innovation activity had cooperated with universities or universities of applied sciences. Eight per cent of research and development enterprises had had innovation cooperation with universities located in EU-EFTA countries, and seven per cent with universities in other countries.

By the number of enterprises, the biggest industry with innovation cooperation was computer programming (J62) in 2016 to 2018. Computer programming enterprises formed the biggest group of enterprises in an individual industry that had innovation cooperation in the EU-EFTA area. Computer programming enterprises also cooperate with partners located outside the EU-EFTA area with a significant number of enterprises.

Table 1. Prevalence of cooperation in innovation activity in different areas in 2016 to 2018, share of enterprises with innovation activity

	Finland %	Other EU or EFTA %	All other countries %
Consultants, commercial labs, or private research institutes	27.9	7.9	2.4
Suppliers of equipment, materials, components or software	24.4	11.7	5.6
Enterprise customers	20.3	7.7	4.1
Competitors	6.2	2.8	1.2
Other enterprises (outside the group and not mentioned elsewhere)	14.1	4.4	2.4
Enterprises within the enterprise group	13.1	9.1	4.8
Universities and universities of applied sciences	23.4	4.0	1.6
Government or public research institutes	13.1	2.9	0.9
Clients or customers from the public sector	5.9	1.2	0.6
Non-profit organisations	5.0	1.2	0.5
Clients or customers from the private sector	5.3	0.7	0.4

Further information about cooperation by industry and size category

Cooperation by enterprises and location and partners of cooperation in innovation activity by enterprise size category

Cooperation by enterprises and location and partners of cooperation in innovation activity by industry

10. Legislation has features both advancing and hampering innovation activity – data protection legislation influences enterprises' possibilities to innovate

Of all enterprises in the survey, 16 per cent and almost every fourth of those with innovation activity assessed that some sub-area of legislation mentioned in the inquiry had initiated or facilitated innovation activity in 2016 to 2018. The sub-areas of legislation inquired were product safety and consumer protection legislation, environmental legislation, intellectual property rights, tax legislation, employment, worker safety or social affairs legislation, data protection (such as GDPR), health legislation and traffic legislation. Only a few per cent of enterprises with no innovation activity assessed the importance of legislation was positive for innovation activity.

Every fourth of all enterprises felt that legislation prevented or hampered innovation activity or that legislation increased the costs of innovation activity. Roughly every third enterprises with innovation activity assessed so, as did nine per cent of enterprises with no innovation activity.

Two out of three respondents to the inquiry answered that said sub-area of regulation had no effect on innovation activity or that they were not relevant to innovation activity.

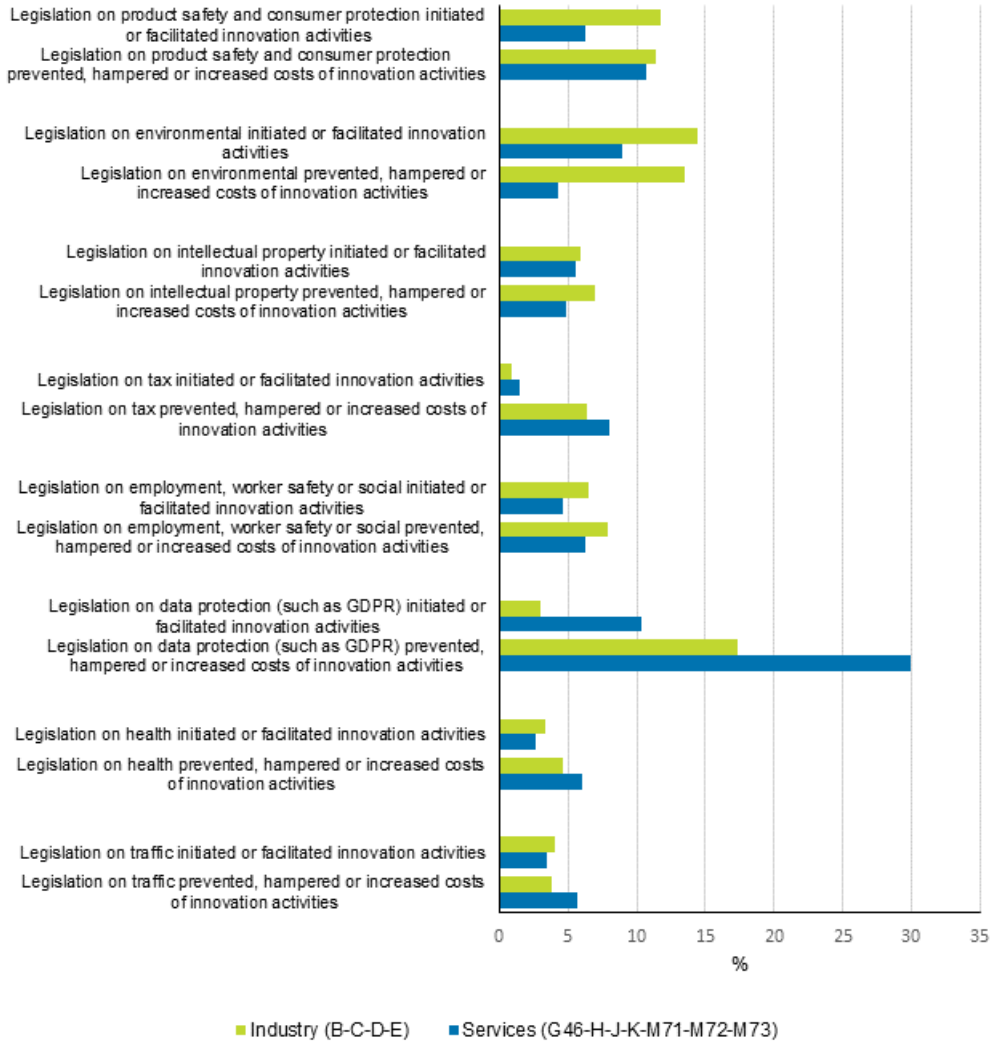
Big enterprises felt more generally than smaller ones that legislation or regulation had some effect on innovation activity.

The results show that innovation activity was most influenced by product safety and consumer protection legislation and environmental legislation, but above all by legislation related to data protection.

Product safety and consumer protection legislation appeared more positive for innovation activity in manufacturing than for service enterprises. Product safety and consumer protection legislation was seen equally generally as hampering innovation activity in enterprises with innovation activity in manufacturing and service industries. Environmental legislation has a bigger significance for manufacturing enterprises than for service industries both as advancing innovation activity but most of all as a factor hampering innovation activity. In all, environmental legislation was felt most commonly to be a factor increasing and promoting innovations than hampering them. Legislation related to intellectual property rights or health and traffic with their effects connected to innovation activity do not differ much in manufacturing and service industries.

Tax legislation was not considered to have features advancing innovation activity. In contrast, legislation related to data protection among the legislation sub-areas has most generally effects on innovation activity, most of all in service industries, such as in financing and insurance activities, information service activities, publishing activities and advertising and market research, where enterprises assessed it to have positive effects on innovation activity, but above all features preventing and hampering or increasing costs in innovation activity. In addition, in manufacturing data protection legislation was generally seen as hampering innovation activity.

Figure 14. Enterprises' estimate of the effects of different sub-areas of legislation on innovation activity in total industry and services in 2016 to 2018, share of enterprises with innovation activity



Further information on the effects of legislation on innovation activity by industry and size category

Effect of legislation on innovation activity and factors hampering innovation activity by industry group and enterprise size category

Effect of legislation on innovation activity and factors hampering innovation activity by industry

11. Most significant factors hampering innovation activity were lack of skilled employees, high costs and challenging market situation as well as different priorities within the enterprise

The Innovation Survey inquired from both enterprises with innovation activity and from enterprises with no innovation activity during the survey period about factors that hampered the decision to start innovation activity or in general hampered the execution of innovation activity.

The hampering factors were felt more generally in enterprises with innovation activity than in those that did not have innovation activity in the reference period.

For example, 30 per cent of enterprises with innovation activity estimated uncertain market demand had hampered innovation activity or its starting at least to medium degree, while nearly 10 per cent of enterprises with no innovation activity thought so.

Figure 15. Factors hampering starting or execution of innovation activity by importance in 2016 to 2018, share of those with innovation activity

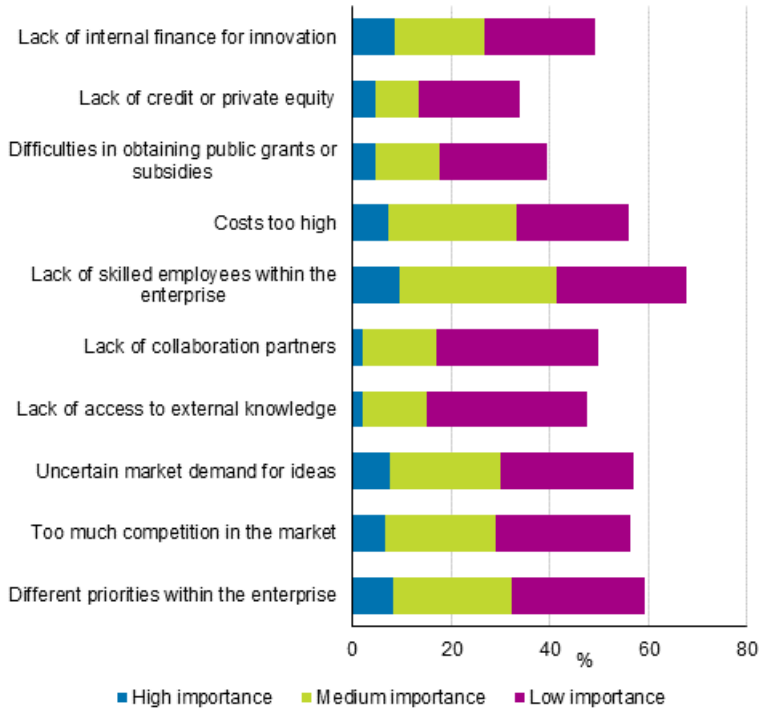
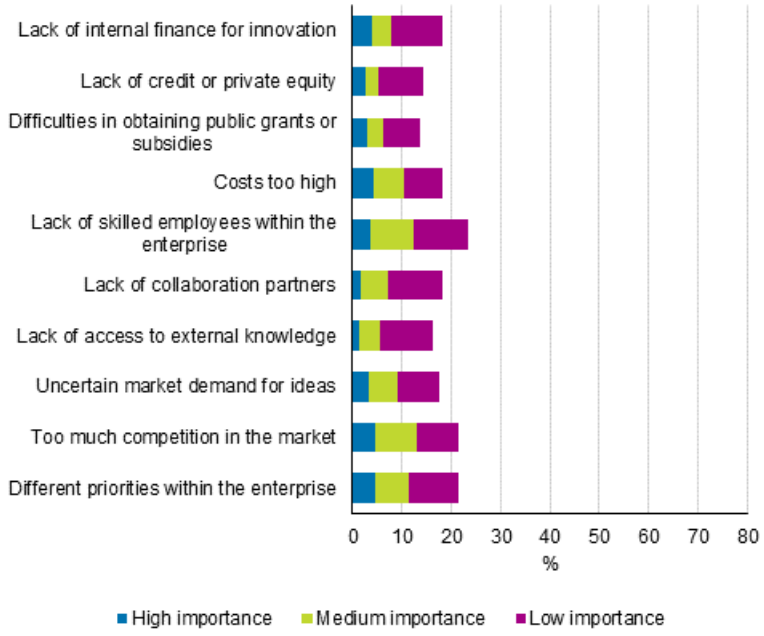


Figure 16. Factors hampering start or execution of innovation activity by importance in 2016 to 2018, share of enterprises with no innovation activity



According to the survey, factors hampering innovation activity most and most generally were lack of skilled employees in the enterprise, different priorities within the enterprise, market situation or uncertain market demand for the enterprise's products and too much competition and too high costs of innovation activity.

As many as over 40 per cent of those with innovation activity felt that lack of skilled employees in the enterprise was of at least medium importance. One third assessed that different priorities within the enterprise were at least moderately hampering the enterprise's innovation activity.

Factors connected to the market situation and uncertainty of demand for the enterprise's products, as well as views of high costs and lack of internal finance were generally challenges for developing new. Instead, availability of financing and public support – or the enterprise's access to external knowledge and finding of collaboration partners – did not appear as critical challenges from the viewpoint of innovation activity.

Manufacturing enterprises feel factors hampering innovation activity slightly more generally than enterprises in service industries. For instance, uncertain market demand for the enterprise's ideas was at least of medium importance for more than every third manufacturing enterprise with innovation activity. In service industries the corresponding share was 25 per cent. Costs of product and process development work are also a more common challenge for enterprises in manufacturing than in service industries.

As a rule, assessments of the importance of different hampering factors with respect to each other appear very similar in manufacturing and services. In manufacturing enterprises lack of skilled employees was a big or moderate hampering factor for 43 per cent of those with innovation activity. The share was 39 per cent in services. Lack of external knowledge was a big or moderate hampering factor in manufacturing for 17 per cent of those with innovation activity and in services for 13 per cent of innovators.

Lack of skilled employees was at least of medium importance for a significant part of enterprises in all size categories. In large enterprises innovation possibilities are burdened by various priorities within the enterprise. Big and extensive markets, alternative technologies and several product lines can cause questions of choice for which reason it is not easy to allocate development work.

As with enterprises with innovation activity, enterprises with no development and introduction of innovations in 2016 to 2018 most often mentioned too much competition in the market as well as lack of skilled employees and different priorities as the factors hampering innovation activity.

Further information about factors preventing and hampering innovation activity by industry and size category

Effect of legislation on innovation activity and factors hampering innovation activity by industry group and enterprise size category

Effect of legislation on innovation activity and factors hampering innovation activity by industry

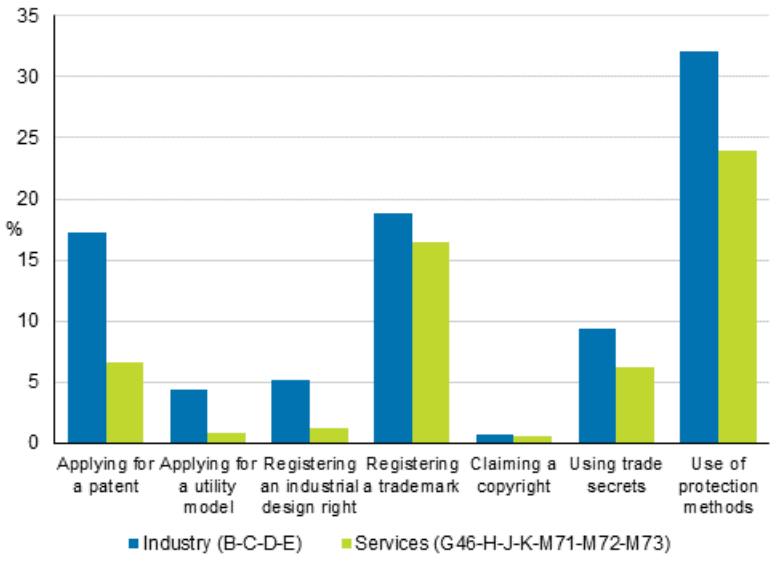
12. Protection of inventions and novelties and acquisition and transfer of intellectual property rights

Nearly every fifth enterprise surveyed, 18 per cent, had used some protection measures (patent application, utility model application, registration of industrial design right, registration of trademark, application for copyright or use of trade secret) in 2016 to 2018. The protection measures had been used by 28 per cent of enterprises with innovation activity, whose share of enterprises in the data was 62 per cent. In contrast, four per cent of enterprises with no innovation activity in 2016 to 2018 had carried out said protection measures.

The most commonly used protection measures were trademark registration, 18 per cent of those with innovation activity, and patenting, 12 per cent of innovators. A few per cent of those with innovation activity applied for a utility model, three per cent registered an industrial design right and nearly one per cent applied for copyright.

The use of the protection measures mentioned in the survey was more general in manufacturing than in service industries. In manufacturing the use of protection measures becomes significantly more common as enterprise size grows. Nine per cent of smaller manufacturing enterprise with innovation activity applied for a patent in 2016 to 2018, every fourth of medium-size enterprises and 60 per cent of the biggest enterprises. Respectively, the shares were two, seven and 25 per cent for registrations of industrial design right and 11, 27 and 46 per cent for trademark registrations.

Figure 17. Use of protection measures in total industry and services in 2016 to 2018, share of enterprises with innovation activity



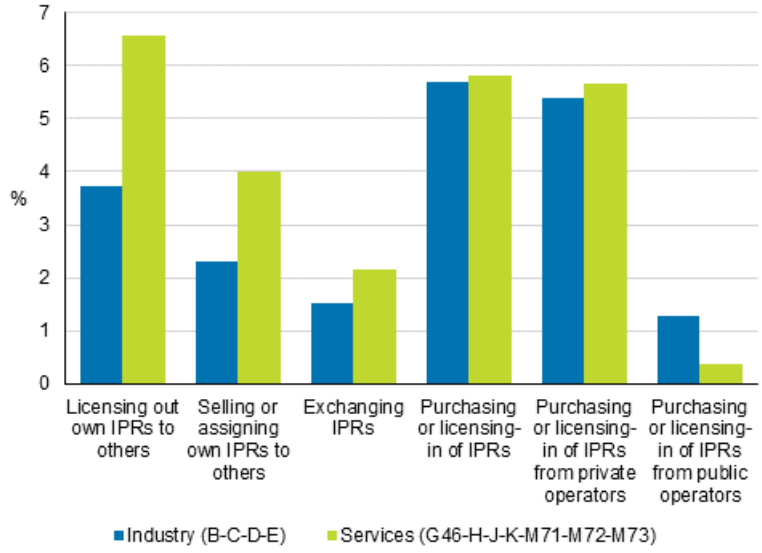
Five per cent of enterprises with innovation activity licensed out and three per cent sold or transferred their intellectual property rights (IPR) to others in 2016 to 2018. A couple of per cent of enterprises with innovation activity transferred (e.g. cross-licensing) intellectual property rights. Licensing, sale or other transfer of intellectual property rights, or their exchange, was most common among large enterprises, equally in manufacturing and service industries. For example, around every fifth enterprise with innovation activity in the biggest size category licensed out its intellectual property rights to others. For small and medium-size enterprises licensing and transfer of IPR took place somewhat more commonly in service enterprises than in manufacturing enterprises.

Around six per cent of those with innovation activity purchased or licenced-in patents or other intellectual property rights in 2016 to 2018. Intellectual property rights were most often acquired from the private sector. Acquisition of intellectual property rights was equally common in manufacturing and services.

Although the use of protection measures, such as patenting, was more general in manufacturing enterprises than in service enterprises, other measures connected to intellectual property rights were implemented in service industries more generally than in manufacturing.

For enterprises with no innovation activity in 2016 to 2018 measures related to intellectual property rights – licensing, sale, other transfer or acquisition – were of low occurrence.

Figure 18. Licensing, sale and other transfer of intellectual property rights (IPR) and acquisition in total industry and services in 2016 to 2018, share of enterprises with innovation activity



Further information about protection measures and acquisition and transfer of intellectual property rights

Protection and IPR measures and acquisition of knowledge and technology in enterprises by industry group and enterprise size category

Protection and IPR measures and acquisition of knowledge and technology in enterprises by industry

13. Acquisition of technical services and machinery, equipment and software

Technical services, which include any consulting activity that involves any kind of technical and scientific information, with various engineering services, testing services, industrial design services, R&D services and the like, were purchased by 70 per cent of enterprises with innovation activity. The majority of them, 68 per cent, purchased services from the private sector. Every fifth enterprise with innovation activity purchased technical services from the public sector, that is, public research organisations, universities and universities of applied sciences.

Considerably fewer, good one-quarter of enterprises with no innovation activity in 2016 to 2018 purchased technical services during the survey period. Purchases were focused on acquisitions from the private sector and only three per cent of the enterprises in the group acquired technical services from the public sector.

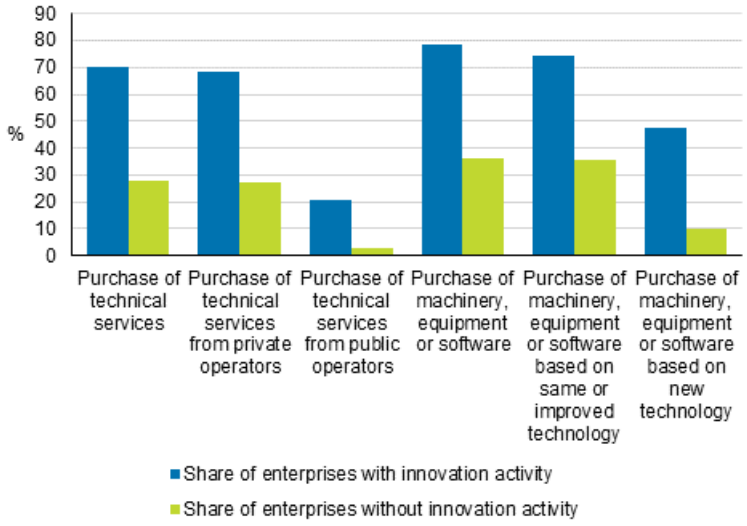
The acquisition of technical services was more common in manufacturing enterprises than in service industries. In the largest size category 80 per cent of manufacturing enterprises with innovation activity purchased technical services produced by the public sector. In the biggest enterprises in services the corresponding share was one quarter.

As with the acquisition of technical services, the acquisition of machinery and equipment and software was considerably more common in innovating enterprises than in other enterprises in 2016 to 2018. Three out of four innovating enterprises acquired the same or improved technology used before in the enterprise. Nearly one half acquired technology that was new to the enterprise.

Of other enterprises 35 per cent purchased technology similar to that used before and every tenth enterprise new technology.

Innovating enterprises of all sizes made technology acquisitions very generally both in service industries and manufacturing.

Figure 19. Prevalence of acquisition of technical services and machinery, equipment and software in 2016 to 2018



Further information about the prevalence of acquisitions of technical services and machinery and equipment

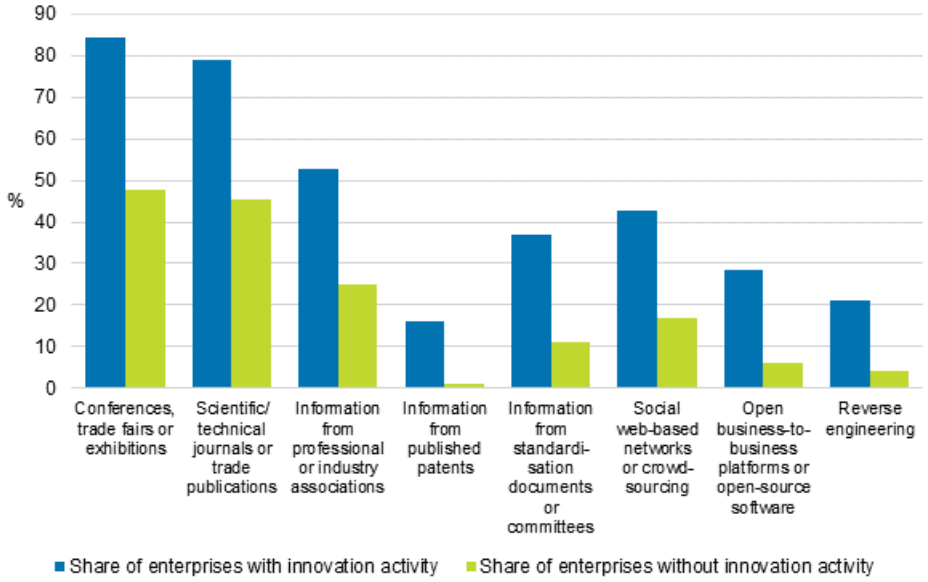
Protection and IPR measures and acquisition of knowledge and technology in enterprises by industry group and enterprise size category

Protection and IPR measures and acquisition of knowledge and technology in enterprises by industry

14. Channels to acquire knowledge and knowledge transfer and sharing in the enterprise

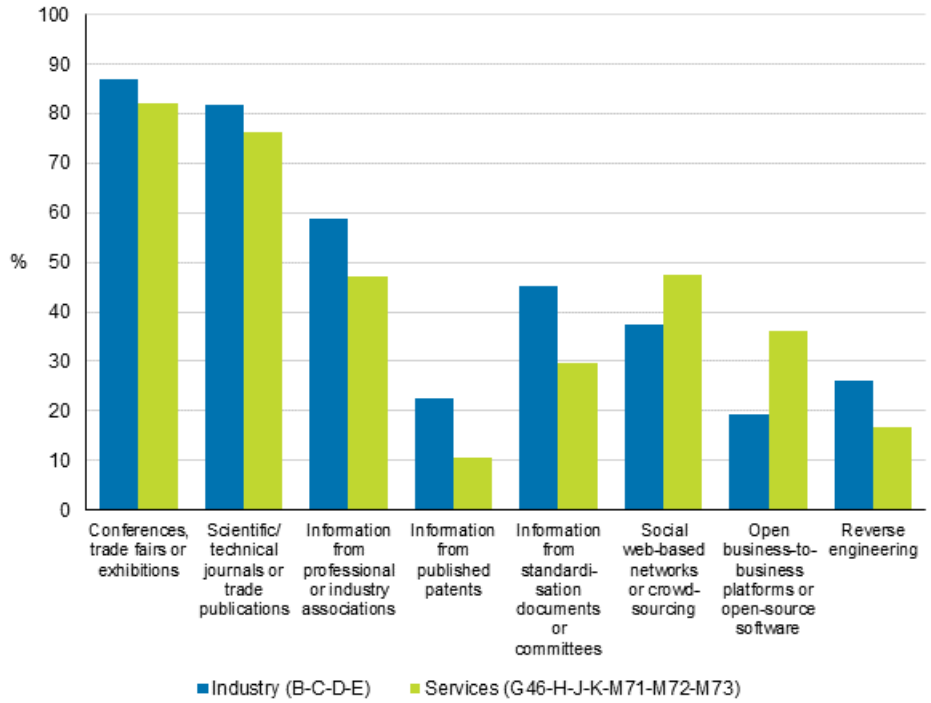
Of the channels to acquire knowledge inquired in the Innovation Survey the most common ones for enterprises were conferences, trade fairs and exhibitions. Of enterprises with innovation activity, 84 per cent received information in this way, 48 per cent of other enterprises. The next most common channels to acquire knowledge were scientific and technical journals or commercial publications and professional and industry associations. Information included in patents appeared a worthwhile source of information only for those with innovation activity. Enterprises with no innovation activity did not widely use possibilities provided by open environments or information derived from reverse engineering. Otherwise knowledge was sought fairly actively from events, journals and publications, for example.

Figure 20. Prevalence of the use of channels to acquire knowledge in 2016 to 2018



Information included in published patents, standardisation documents or committees or reverse engineering were due to their technical emphasis more common sources of knowledge for manufacturing operators than for service industries. In contrast, enterprises in service industries reported more often than manufacturing enterprises social networks and crowdsourcing and open platforms and systems as channels to acquire knowledge.

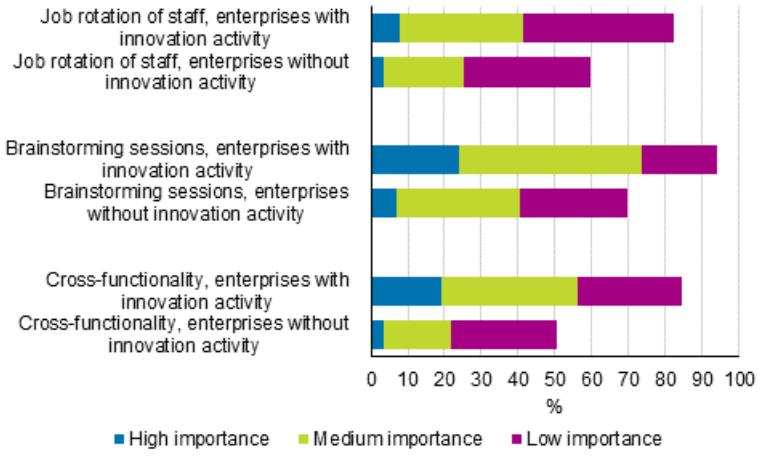
Figure 21. Prevalence of the use of channels to acquire knowledge in total industry and services in 2016 to 2018, share of enterprises with innovation activity



Planned job rotation of staff across different functional areas is at least a relatively important method of organising work for 41 per cent of enterprises with innovation activity, and for every fourth of other enterprises in the survey. Cross-functional work groups or teams are regarded even more often than this as important methods of organising work in enterprises with innovation activity.

The most important of the methods of organising work inquired were brainstorming sessions, which were considered of at least medium importance by over 70 per cent of innovating enterprises and 40 per cent of other enterprises.

Figure 22. Prevalence and importance of methods of organising work in 2016 to 2018



The importance of different methods of organising work were assessed fairly similarly in manufacturing and services. Brainstorming sessions were assessed as being of at least medium importance by 77 per cent of enterprises with innovation activity in service industries and by 70 per cent of manufacturing enterprises.

For job rotation the results were 39 and 44 per cent, respectively, and for cross-functional work groups 58 and 53 per cent.

Job rotation of staff was nearly as common in different size categories, especially in manufacturing enterprises. Brainstorming sessions were considerably general in all size categories, but clearly more general in the largest enterprises in manufacturing than in smaller enterprises. In application of cross-functionality there was a clear difference between smaller and bigger manufacturing enterprises, because nearly nine out of ten big enterprises organise their activity with cross-functional work groups and teams. In service industries cross-functional work groups were applied more evenly in all size categories.

Further information by industry and size category

Protection and IPR measures and acquisition of knowledge and technology in enterprises by industry group and enterprise size category

Protection and IPR measures and acquisition of knowledge and technology in enterprises by industry

15. Utilisation of data and digitalisation in enterprises' business activity

In the Innovation Survey, data referred to big data, data from the business's own activity, and to public sector open data.

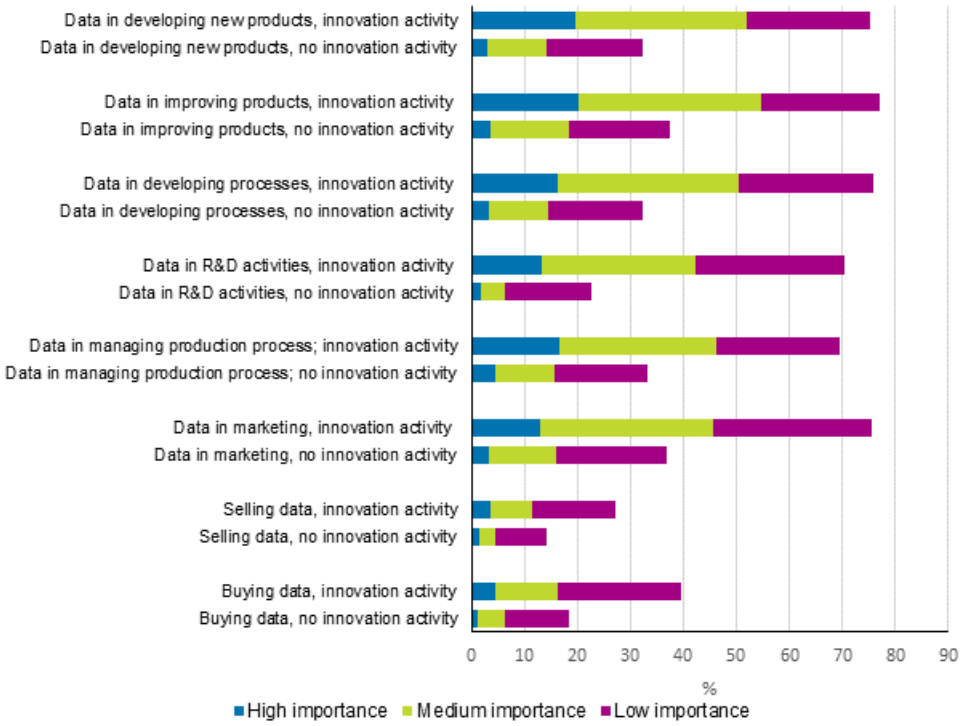
Twenty-six per cent of all enterprises reported at least one use of data as having high importance in 2016 to 2018. Data were considered of at least medium importance for at least one use of data in the enterprise's business activity by 32 per cent of enterprises. Data were regarded as having at most low importance by 14 per cent of enterprises and for 28 per cent of enterprises data were not significant in the review period.

Except for selling and buying of data, the uses of data in the inquiry receive fairly similar assessments of their importance. In production development and improvement, in development of process innovations, in research and development, in management of production processes and in marketing the importance of data was assessed as high by 9 to 14 per cent of all enterprises in the survey. These uses of data were assessed as having medium importance – depending on the use target – by 20 to 27 per cent of enterprises. In practice, 30 to 40 per cent of enterprises assessed these sub-areas of data economy as being of at least medium importance.

The utilisation of data was more significant and general for innovating enterprises than for other enterprises. Seventeen per cent of enterprises with innovation activity assessed the importance of data in managing the production process as high and 30 per cent as medium high. For other enterprises the corresponding shares were 4 and 11 per cent. In marketing the importance of data was assessed as high by 13 per cent of those with innovation activity, and as medium high by 33 per cent. For other enterprises the corresponding shares were 3 and 13 per cent.

Examined from all enterprises, data are used for different uses as widely in manufacturing as in services except for the utilisation of data in managing the production process, which is more common in manufacturing than in service industries. Even though the utilisation of data is in many respects equally common in manufacturing and service enterprises, in services the importance of data is higher than in manufacturing in product and process development and marketing. Buying of data from others is also assessed as important in service industries more generally than in manufacturing enterprises.

Figure 23. Prevalence and importance of different uses of data in 2016 to 2018, shares of enterprises with innovation activity and those with no innovation activity*



*Some of enterprises that did not have research and development or other innovation activity in the survey period have responded to questions on innovation activity in utilisation of data. In the question on data utilisation development work may have been interpreted more widely than in connection with innovation activity, for example, through development work in stages or continuous improvement.

Figure 24. Prevalence and importance of different uses of data in total industry and services 2016 to 2018, shares of enterprises with innovation activity*

*Some of enterprises that did not have research and development or other innovation activity in the survey period have responded to questions on innovation activity in data utilisation. In the question on data utilisation development work may have been interpreted more widely than in connection with innovation activity, for example, through development work in stages or continuous improvement.

The importance of data to enterprises' business activity was also inquired in two previous Innovation Surveys with questions of more or less similar contents. As far as the data can be considered comparable in different periods, the importance of data in enterprises' business activity appears to have grown from the previous measuring periods. Enterprises reported utilisation of data now more generally than before.

In connection with the Innovation Survey, digitalisation refers to transferring goods, services and their production or distribution to electronic format.

One-third of all enterprises considered at least one factor related to digitalisation as having high importance. Around one third assessed at least one factor as having medium importance, and 16 per cent thought digitalisation had low importance in their enterprise. Similarly 16 per cent felt that digitalisation did not concern their enterprise in the survey period 2016 to 2018.

The digitalisation views presented in the inquiry, that is, digital products, cloud services, social media, Internet of Things IoT, robotics, and digitalisation in production, designing, marketing and distribution were considerably more common and important for enterprises with innovation activity than for other enterprises.

The most common and important uses of digital transformation and digitalisation were digital products and cloud services in 2016 to 2018. In all, 17 per cent of all enterprises assessed the importance of digital products as high and 26 per cent as medium high. The importance of cloud services was assessed as even more important than that, as 46 per cent of enterprises assessed they were at least of medium importance. Enterprise respondents considered digitalisation the next most important in marketing and producing products.

Apart from robotics and the Internet of Things, the features related to digitalisation were assessed in service enterprises more often as having high or medium importance than in manufacturing enterprises. Robotics was at least relatively important for nearly one-third of enterprises with innovation activity in manufacturing, while the share in service enterprises was around one-half of that. Instead, the Internet of Things IoT appears to have almost equal importance for enterprises with innovation activity in manufacturing and service industries.

Figure 25. Prevalence and importance of digitalisation in 2016 to 2018, shares of enterprises with innovation activity and enterprises with no innovation activity

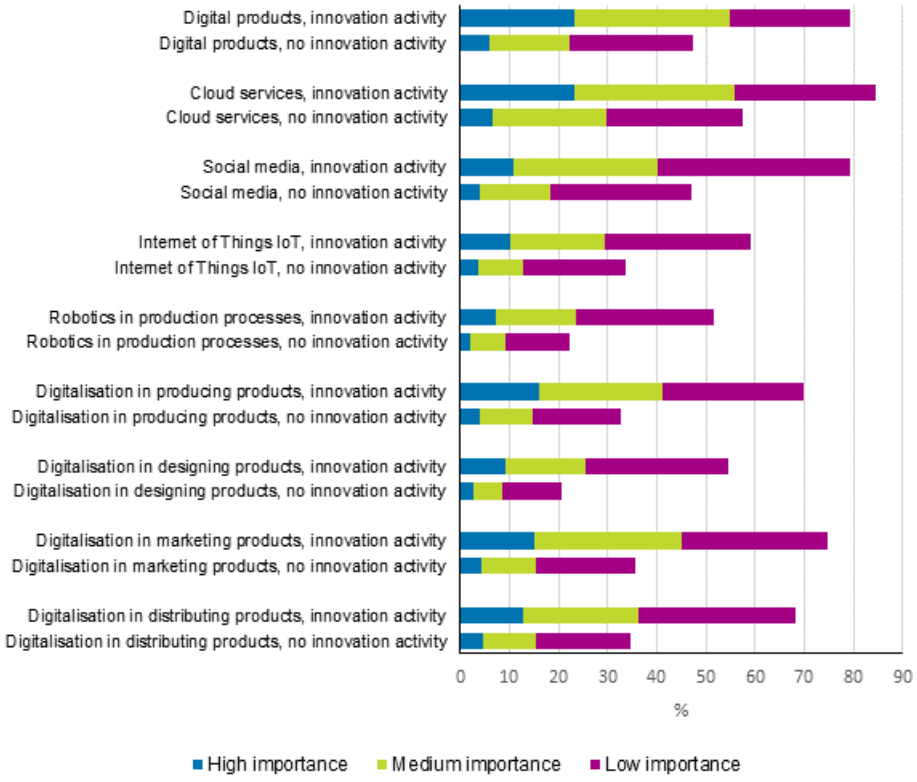
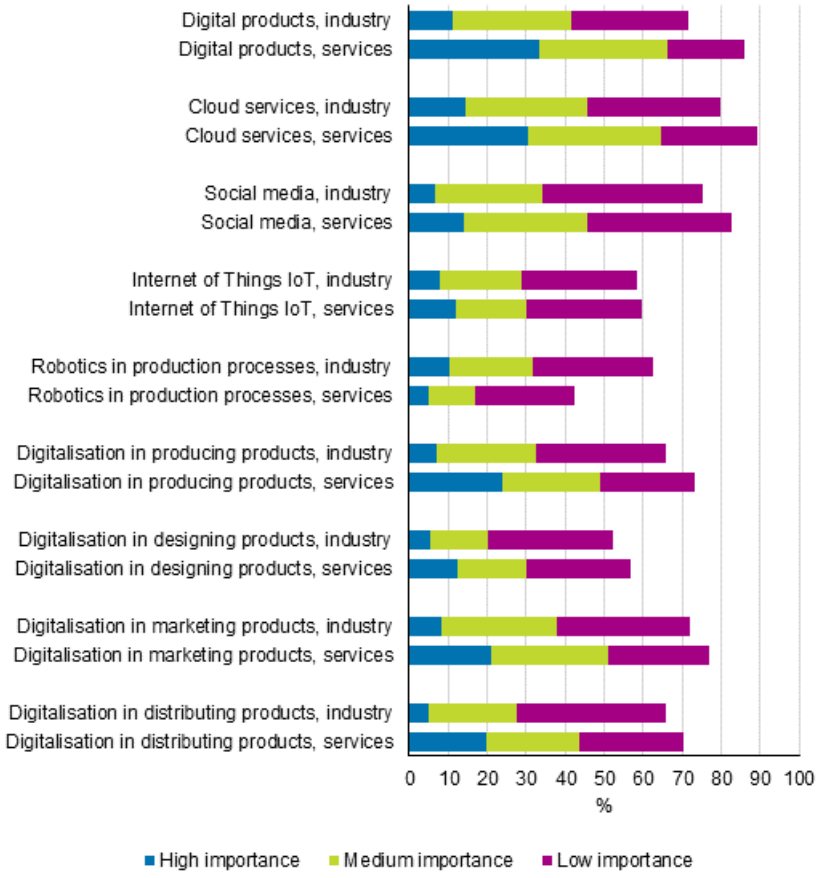


Figure 26. Prevalence and importance of digitalisation in total industry and services in 2016 to 2018, share of enterprises with innovation activity



Further information by industry and size category

Utilisation of data and digitalisation in enterprises by industry group and enterprise size category

Utilisation of data and digitalisation in enterprises by industry

16. Cooperation between enterprises and research organisations

In this survey, cooperation between enterprises and research organisations refers to organised, active cooperation, as well as other transfer of know-how, collaboration and goal-oriented interaction or communication. Research organisations refer to both domestic and foreign universities, universities of applied sciences and research institutes.

In all, 23 per cent of enterprises reported cooperation with research organisations in 2016 to 2018. Fifteen per cent of enterprises had had innovation cooperation with research organisations and 17 per cent other cooperation.

Cooperation with universities was reported by 16 per cent of enterprises. Fifteen per cent had had cooperation with universities of applied sciences. Eleven per cent of all enterprises had been cooperating with research institutes.

Table 2. Cooperation with research organisations in 2016 to 2018, share of enterprises, %

All NACE, total	Universities	Universities of applied sciences	Research institutes	Co-operation by type
Innovation co-operation	11.0	6.8	7.9	14.6
Other co-operation	10.1	11.5	6.6	16.8
Co-operation by organisation	15.7	14.5	11.3	22.8
Industry	Universities	Universities of applied sciences	Research institutes	Co-operation by type
Innovation co-operation	15.2	10.5	11.7	19.9
Other co-operation	13.3	15.7	9.5	22.0
Co-operation by organisation	21.2	20.5	16.4	29.7
Services	Universities	Universities of applied sciences	Research institutes	Co-operation by type
Innovation co-operation	7.9	3.9	4.9	10.6
Other co-operation	7.6	8.3	4.4	12.9
Co-operation by organisation	11.6	10.0	7.5	17.5

The most commonly mentioned results of cooperation were an overview of future trends and markets, introduction of a new technology, method or device and new or improved products. In manufacturing the most often mentioned result was the introduction of a technology and in service industries, the overview of future trends and markets.

The least often mentioned results of research organisation cooperation were access to, or progress on, international markets and participation in international research and innovation programmes.

Results of the university cooperation were most commonly felt to be strengthening the knowledge base and competence including patents and other intellectual property rights and overview of future trends and markets. Views concerning the future were assessed in service industries considerably more commonly than in manufacturing. After them, introduction of a new technology and product development were cited most often.

Those having cooperated with universities of applied sciences also selected most generally as the results of cooperation introduction of a new technology especially in manufacturing, an overview of future particularly in service industries and new and improved products in both manufacturing and service industries.

Cooperation with research institutes produced in manufacturing most generally new or improved products, further widened cooperation, strengthened the knowledge base and competence, also in the form of patents and other intellectual property rights, and offered an overview of future trends and markets, which was also seen most often in service industries as a result of cooperation with research institutes.

Table 3. Results of cooperation with research organisations in 2016 to 2018 or expectations concerning results by the end of 2020, shares of those having cooperated with different research organisations

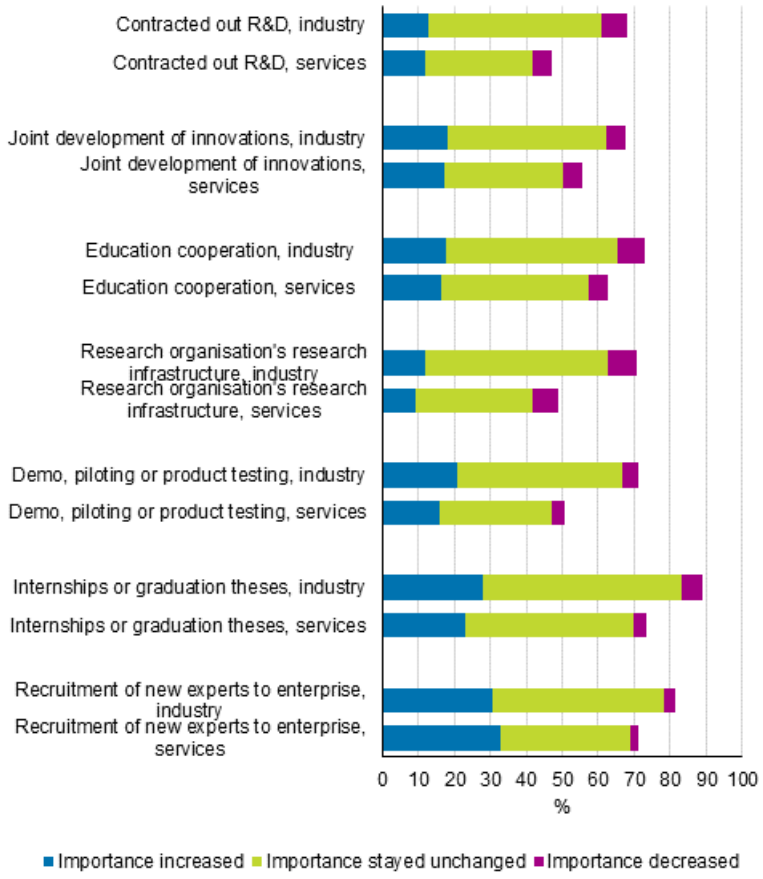
	Enterprises with co-operation with universities	Enterprises with co-operation with universities of applied sciences	Enterprises with co-operation with research institutes
	%	%	%
Strengthening the knowledge base and competence including patents and other IPR	47.5	25.6	39.8
An overview of future trends and markets	45.1	28.0	43.5
Introduction of a new technology, method or device	41.8	33.4	35.9
New or improved products (goods or services)	42.0	31.9	40.6
Access to, or progress on, international markets	15.0	6.8	26.6
Widening of cooperation with research organisation	36.4	17.3	38.9
Participation in international research and innovation programmes	22.3	7.4	29.9
Other results	2.8	4.9	0.8

Nearly 60 per cent of those having cooperated had contracted out R&D and good 60 per cent had joint development of co-creation and use of research organisation's research infrastructure and services. Demos, piloting or product testing were also cooperated on by good 60 per cent of those having cooperated. Forms of cooperation were reported more generally in manufacturing enterprises than in service industries.

Cooperation with research organisations concerned most commonly education and students in 2016 to 2018. Over 80 per cent of those having cooperated – in manufacturing 89 per cent and in services 74 per cent of enterprises having cooperated – had collaborated with students in the form of internships or graduation theses. In all, 77 per cent of those having cooperated had recruited new experts to the enterprise, and 68 per cent had had education cooperation.

The majority of those with various types of cooperation with research institutes assessed the forms of cooperation had stayed unchanged in 2016 to 2018, but recruitment of new experts was quite generally regarded as having grown in importance from before. Internships and graduation theses were also seen as having grown in significance considerably, especially in manufacturing. Next most commonly growth was assessed as having taken place in joint development of co-creation and education cooperation and in piloting and product testing in manufacturing.

Figure 27. Forms, prelevance and development of importance of cooperation made with research organisations in 2016 to 2018 compared to before in total industry and services, share of enterprises having cooperated with research organisations

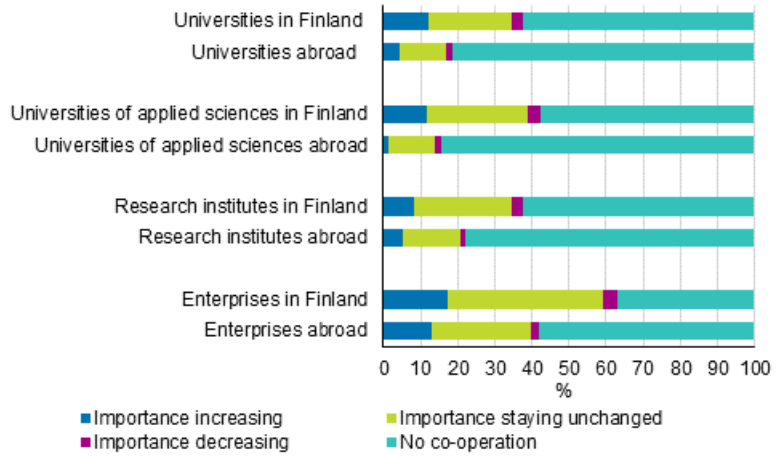


Enterprises in manufacturing reported slightly more often than service industries about their cooperation plans in the near future related to innovation activity. Most commonly cooperation was planned with Finnish enterprises, 72 per cent of manufacturing enterprises and 56 per cent of service enterprises. Next most generally cooperation was assessed to be made with Finnish universities of applied sciences, in manufacturing 53 per cent and in services 35 per cent.

Plans to cooperate with foreign enterprises were slightly more common, 47 per cent of manufacturing enterprises and 38 per cent of service enterprises than with Finnish universities, 44 and 32 per cent, respectively, or with Finnish research institutes, 49 and 29 per cent, respectively.

In relative terms, the importance of cooperation was estimated to grow with Finnish universities and foreign enterprises, but almost equally much was expected of collaboration with domestic enterprises and universities of applied sciences.

Figure 28. Estimate of the importance of cooperation partners for R&D and other innovation activity to the end of 2020, share of all enterprises



Further information about cooperation between enterprises and research institutes by industry and size category

Cooperation between enterprises and research institutes by industry group and enterprise size category

Cooperation between enterprises and research institutes by industry

Statistics Finland

Suomen virallinen tilasto
Finlands officiella statistik
Official Statistics of Finland

Science, Technology and Information Society 2020

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tel. +358 29 551 2220
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Publication orders, Edita Publishing Oy
tel. +358 20 450 05
www.editapublishing.fi

ISSN 1796-0479
= Official Statistics of Finland
ISSN 1797-4399 (pdf)