

KfW Research

»»» KfW SME Innovation Report 2019 Innovator rate drops to 19%

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Innovator rate drops to 19%

The rate of innovators in the SME sector – the proportion of innovative businesses – has dropped again by four percentage points to 19%. The number of innovative SMEs dropped by 125,000 to approx. 725,000 enterprises. The share of innovative SMEs has thus fallen to the lowest level since innovation activity was first surveyed with the KfW SME Panel around one and a half decades ago. The proportion of innovative businesses has more than halved (-56%) since the record high of 2004/2006. It is primarily small businesses that have stopped innovating. The innovator rate dropped least in R&D-intensive manufacturing.

The current decline is due to trends in both product and process innovators. The share of product innovators has dropped to the lowest level ever measured with the KfW SME Panel (13%). The proportion of process innovators has also dropped to 13%. It already matched this record low once before in 2013/2015. The current decline is likely due primarily to the cyclical downturn and SMEs' focus on implementing digitalisation measures. Both contribute to fewer businesses generating traditional innovations.

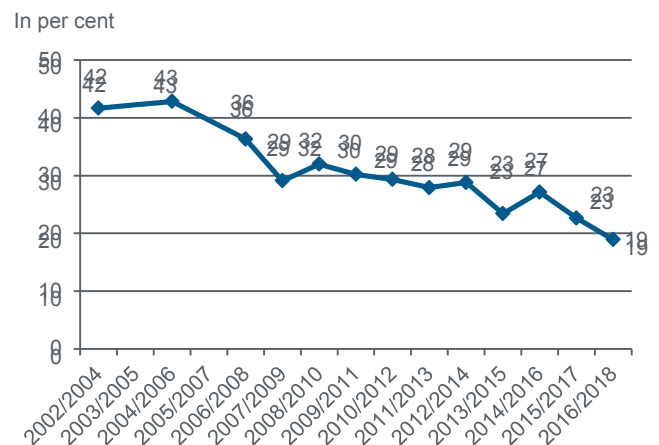
The sum of SMEs' expenditure on innovation and research and development, on the other hand, has risen to EUR 34.4 billion and EUR 18.4 billion, respectively. So while some of the enterprises are abandoning innovation activities, the remaining businesses are continuing their innovation efforts undiminished over the long term as well and some are even intensifying them. Innovation activities are hence increasingly concentrated in fewer firms.

This polarisation should translate into two lines of action for economic policy: One of them is to provide R&D support measures to bolster the development and marketing of new technologies. This is necessary to advance technological progress and secure Germany's long term international competitiveness.

However, R&D support measures are not suitable for enticing the bulk of SMEs to undertake innovation efforts of their own. This is because these enterprises' innovations are not based on own research and development. They require support in the area of organisation and skills including, for example, improving access to technological knowledge, developing an innovation management that is adapted to their needs and meeting their need for skilled labour.

Innovations create new sales potentials and improve the use of resources. In this way they drive economic and productivity growth, speeding up the transformation of the economy.¹ In developed economies they are therefore regarded as guarantors of increasing prosperity.² Moreover, innovations contribute to addressing social challenges such as climate change, healthcare and demographic change. From a business perspective, innovations are an important mechanism for developing a competitive position in the market. Numerous studies confirm that innovations increase enterprises' headcount, turnover, returns and productivity.³ Finally, innovations also benefit the employees of innovative businesses in the form of higher wages.⁴

Figure 1: Development of innovators among SMEs



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

Innovations are more than just novelties based on research and development (R&D), such as lift cabins that are no longer driven by cables in the lift shaft, or brakes that no longer release wear particles. Small and medium-sized enterprises, in particular, often develop innovations out of the normal production process or in cooperation with customers and suppliers without any research activity ('learning-by-doing, using and interacting').⁵ Adapting products to specific customer requests or introducing services such as the assembly of heat pumps into the range of services offered by an installer, for example, are also innovations. A product (including the related service) or manufacturing process is regarded as an innovation when it is new or significantly improved in essential aspects for the enterprise adopting it.⁶

Innovator rate continues downward trend

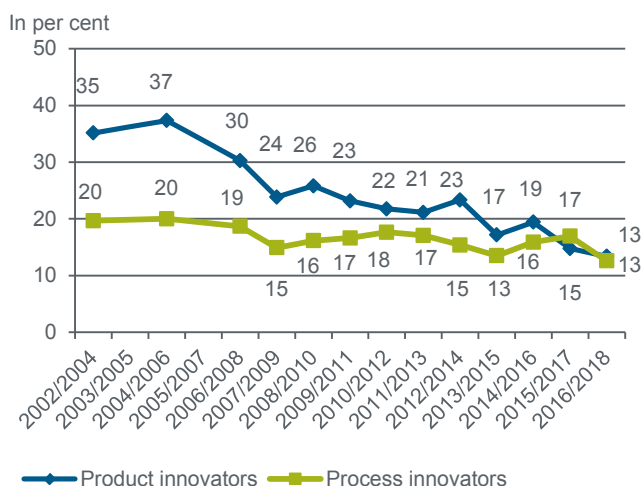
The proportion of SME innovators dropped by around four percentage points to 19% (2016/2018), a similar drop as in the previous period (Figure 1).⁷ The innovator rate measures the share of enterprises that have introduced at least one innovation in the past three years. It has thus fallen to an all-time low since the introduction of the KfW SME Panel. The number of innovative small and medium-sized enterprises currently stands at 725,000. It has fallen by 125,000 enterprises on the previous period.

A possible reason for the decline in the innovator rate on the previous period may be that the cyclical situation has deteriorated on the previous year. Another cause may be that SMEs are currently devoting more effort to digitalisation and reducing traditional innovation activity.⁸

Compared with the peak of 2004/2006, the share of SME innovators dropped by more than half (-56%). The innovator rate dropped particularly sharply in the second half of the 2000s. It initially surged again after the economic and financial crisis. After that, however, the decline continued, if at reduced speed. But it has accelerated again in the past years.

The current decline in the share of innovators is due to the trend in both product and process innovators. The share of businesses that introduced product innovations fell by two percentage points. At 13% it is on the lowest level since the start of the KfW SME Panel (Figure 2). The share of enterprises with process innovations fell by four percentage points on the previous period. That share is also currently at 13%.

Figure 2: Development of SME product and process innovators



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

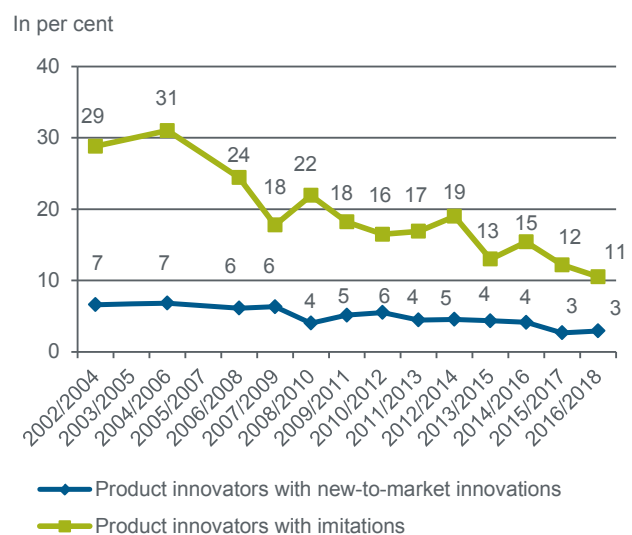
The share of process innovators is thus just as low as in the period of 2013/2015. In other words, just under 500,000 SMEs brought new or improved products to market, while just as many modernised their manufacturing processes in the period under review.

Product imitations: long-term decline continues

Product innovations can be distinguished into new-to-market innovations and product imitations. New-to-market innovations are those for which the innovative company's competitors have so far failed to offer comparable products. Imitative innovations, on the other hand, are defined as innovations which competitors already have in their assortment – possibly with certain modifications.

The bulk of innovations consists in the adoption of innovations made by competitors. This type of innovation is important from a macroeconomic perspective because it ensures broad diffusion of innovations and more efficient use of resources (and thus higher productivity) across the overall economy. The benefit of imitative innovations for consumers is that as the number of suppliers (and users) rises, the price of the products or services usually tends to drop.⁹

Figure 3: Product innovators: new-to-market innovations and imitations



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

The share of SMEs with product imitations dropped by one percentage point to 11% in the period under review. The long-term trend thus continues (Figure 3). Since its peak in 2004/2006, that share has fallen by nearly two thirds. The share of SMEs with product imitations has thus experienced the sharpest drop.

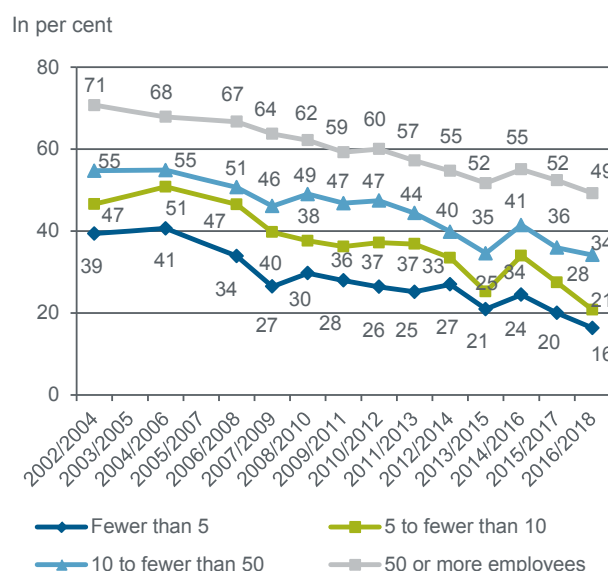
The ability to generate imitative innovations in particular depends to a great extent on the cyclical situation. They can often be brought to market without long periods of development and, in a favourable market situation, relatively quickly. A deterioration in enterprises' economic expectations typically has an adverse effect on the introduction of imitative product innovations.¹⁰

The proportion of enterprises with new-to-market innovations, in turn, has remained steady at 3%. One contributing factor may be that these types of innovations are more often introduced by enterprises that conduct R&D. Besides, this is an activity that fluctuates less with the business cycle.¹¹ Rather, they tend to be brought to market under strategic considerations after extended development phases.¹² In absolute figures, some 420,000 SMEs developed imitative product innovations and 115,000 new-to-market (product) innovations in 2016/2018.

Innovator rate is dropping in all company size classes

Innovator rates are again declining on the previous year in all company size classes (Figure 4).¹³ The decline is somewhat sharper in small SMEs with fewer than ten employees, at 6 to 7 percentage points, than in medium-sized and larger SMEs, where it is -2 and -3 percentage points, respectively.

Figure 4: Innovators by company size



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

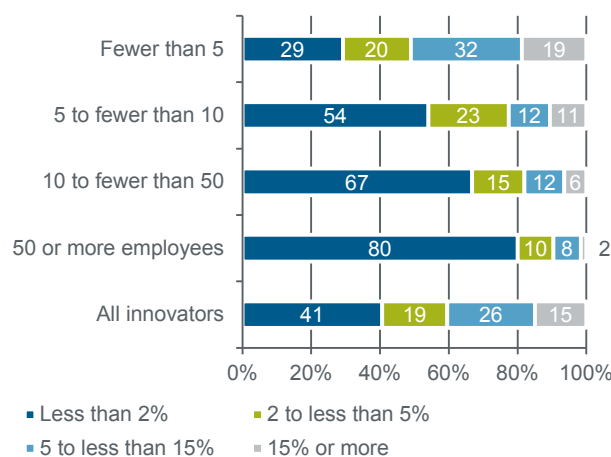
The innovator rate dropped significantly from its peak in middle of the last decade (2004/2006) across all size classes. The smaller the surveyed companies are, the greater the loss of innovators is in the long term. The

decline is 61% for businesses with fewer than five employees but 31% in large SMEs with 50 or more employees (measured here for the decline between 2002/2004 and 2016/2018). The pronounced decline in the share of innovators among small businesses presumably reflects the diminishing share of innovators with (product) imitations set out above.

Throughout the period under review, it was evident that small enterprises are less likely to innovate than large ones. This is because small businesses have fewer resources and cover smaller markets. That makes it harder for them to innovate and reduces profits which they could generate from innovating.

Figure 5: Innovation expenditure as a percentage of annual turnover by enterprise size in 2018

In per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

These disadvantages are exacerbated by the fact that innovation projects often cannot be split up at will.¹⁴ Minimum project sizes and high fixed costs mean that innovations place a higher financial strain on small enterprises than on large ones (Figure 5). For example, 80% of large SME innovators (with 50 and more employees) spend less than 2% of their annual turnover on innovation. However, that percentage of turnover is spent by only 29% of SMEs with fewer than five employees. The higher relative burden also means that small SMEs cannot carry out as many innovation projects at the same time.

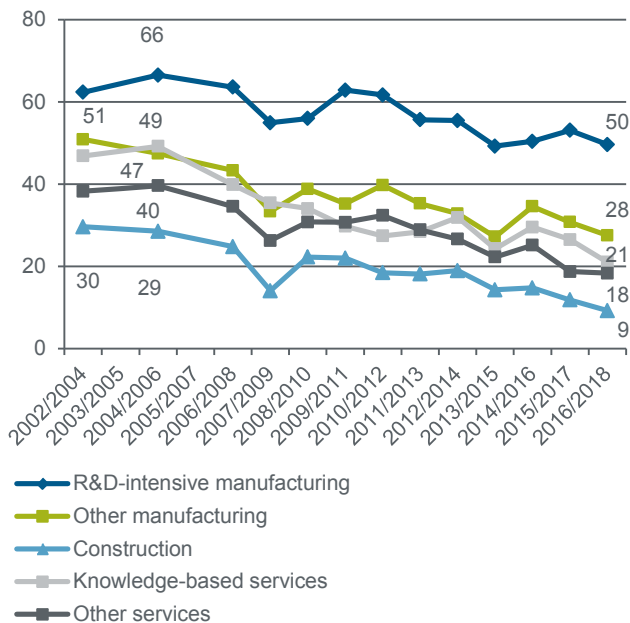
Innovator rates are falling in all sectors

A sector analysis reveals that innovation activity fell in all business sectors in the period under review (Figure 6). In R&D-intensive manufacturing (e.g. mechanical engineering, electronics and chemicals) the positive trend of the previous periods did not continue. However, the decline of three percentage points in the

share of innovative enterprises was below average. Throughout the entire period under review, R&D-intensive manufacturing displayed a clearly undulating trend curve in the innovator rate, with slumps consistently followed by recovery phases. In the long term, however, the innovator rate has declined in R&D-intensive manufacturing as well (-24% on the period of 2004/2006).

Figure 6: Innovators by industry

In per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

The innovator rate experienced a sharper drop in other (non-R&D-intensive) manufacturing, such as the food and animal fodder production and metal products industries, for example. The innovator rate dropped by around 45% on 2002/2004. Still, innovation activity in manufacturing remained the steadiest of all sectors.

In the services sector, the innovator rate in knowledge-based services (e.g. IT and information service providers, law firms, tax accountants and management consulting firms) fell by nearly 60% and in the remaining (non-knowledge-based) services such as hospitality, transport and storage it dropped by more than 60% since 2004/2006. The sharpest drop in the innovator rate – 78% – was recorded in the construction industry.

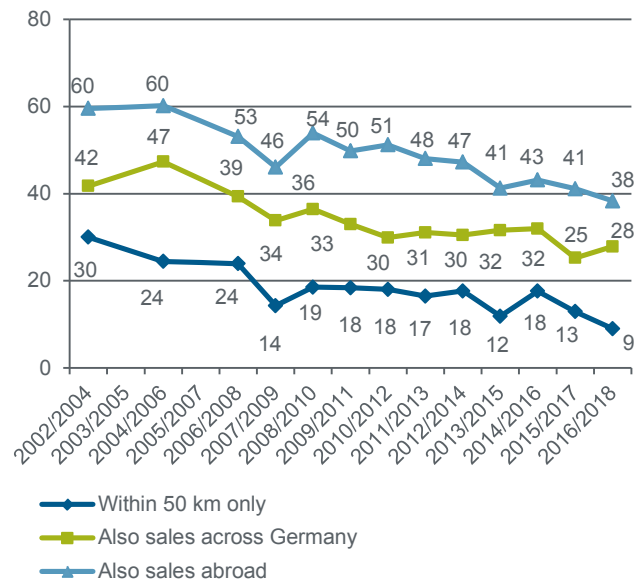
Companies with international operations are also innovating less

The rate of innovators among enterprises operating in foreign markets fell by -3 percentage points on the previous period. It rose slightly among companies that operate throughout Germany, while it dropped among

those whose business is targeted only at a particular region (Figure 7). The drop in the innovator rate among companies with international operations is likely due to the fact that the global economy is slowing and the affected companies are facing a particularly unfavourable cyclical situation.

Figure 7: Innovators by sales region

In per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

The long-term trend by sales region is not as clear cut as the trend by company size and economic sector. Until the height of the economic and financial crisis, the innovator rate dropped most sharply among regionally operating enterprises, although those with business across Germany and beyond also recorded significant decreases.

Then, between 2008/2010 and 2013/2015, and at the current margin internationally operating enterprises, in particular, scaled back their innovation activity. In these phases, growth weaknesses in Europe and the global business cycle probably had an adverse impact on these companies' innovation activity. Within these timeframes, businesses that exclusively supplied the domestic market experienced phases of nearly unchanged innovation activity. This occurred roughly after 2009/2011 among businesses with operations across Germany and between 2008/2010 and 2012/2014 among those operating regionally, for example.

Over the entire observation period, the innovator rate increased with growing regional sales market expansion. This is probably due to the more intense competi-

tion in supra-regional sales markets. Intense competition forces German enterprises to offer products with superior properties and keep their processes efficient.¹⁵ In addition, their presence in international markets is a source of new knowledge and ideas that nurtures innovation activity.¹⁶

Long-term trend: Share of small SMEs and businesses without R&D in innovators is declining

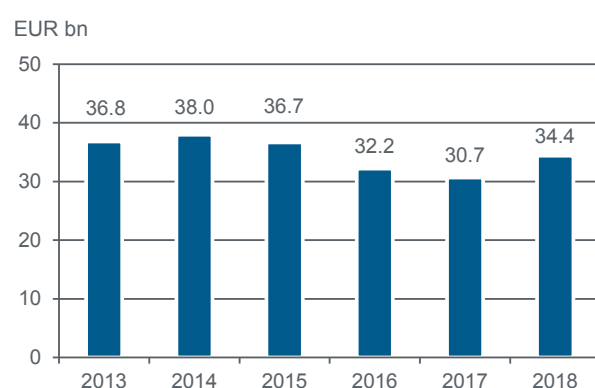
The above changes in innovator rates in the individual groups of enterprises have significant impacts on the composition of innovators. The share of innovators in companies with fewer than five employees has dropped from 80% in the peak level recorded during the period 2004/2006 to 69%. The proportion of innovators without R&D to all innovators has fallen by eight percentage points since its peak level in 2009/2011 to now 66%.

With respect to the sectoral composition of innovators, the share of enterprises in the knowledge-based services sector among all innovators increased by 9 percentage points, while the share of innovators in other services sectors dropped by 14 percentage points from its peak during 2010/2012. By contrast, the percentage of innovators in manufacturing companies rose moderately. The share of construction firms in innovators, in turn, dropped slightly. In particular, the changes that occurred with regard to company size and the share of innovators without R&D mean that it is primarily the diffusion of innovations across the breadth of the economy that has diminished over the past years.

Innovation expenditure is up for the first time since 2014

Innovation expenditure in the SME sector increased on the previous year, ending the mild negative trend of the previous year. Aggregate innovation expenditure was EUR 34.4 billion in the period under review (Figure 8).¹⁷

Figure 8: Aggregate innovation expenditure



Note: Values extrapolated from the number of employees.

Source: KfW SME Panel, own calculations.

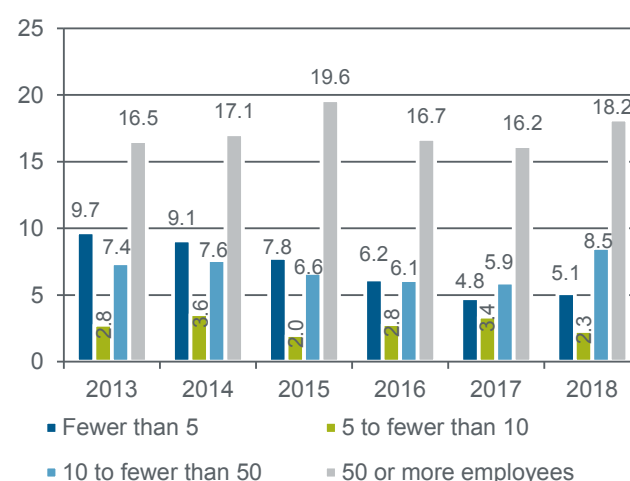
Innovation expenditure includes all spending on innovation including personnel costs and capital expenditure related to developing innovations and bringing them to the market.¹⁸

Large SMEs' innovation expenditure has increased

Large SMEs with ten or more employees contributed most to the growth in innovation expenditure. At EUR 8.5 billion for enterprises with 10 to fewer than 50 employees and EUR 18.2 billion for companies with 50 or more employees, the negative trend of previous years in enterprises in these size classes has turned positive. By contrast, the innovation expenditure of enterprises with fewer than ten employees remains unchanged below the levels preceding the period under review (Figure 9).

Figure 9: Aggregate innovation expenditure by enterprise size

in EUR bn



Note: Values extrapolated from the number of employees.

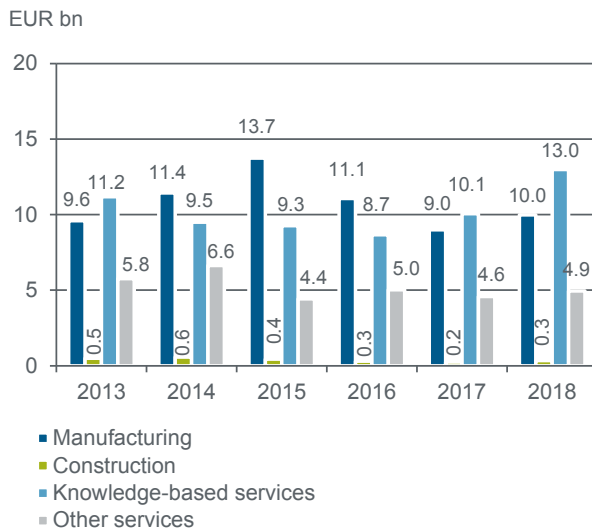
Source: KfW SME Panel, own calculations.

From a sectoral perspective, rising innovation expenditure is primarily the result of developments in manufacturing and knowledge-based services (Figure 10). At EUR 10 billion, innovation expenditure in manufacturing was again near the average of the past five years in the period under review. In the knowledge-based services sector, innovation expenditure rose for the second time in a row. Innovation expenditure in these sectors was even slightly higher than at the start of the period under review.

Innovation expenditure in other services and construction remained steady on the previous year at EUR 4.8 billion and EUR 0.3 billion, respectively. The increase in innovation expenditure is thus primarily due

to sectors that typically have high innovation activity, while small businesses and enterprises from sectors where innovation activity tends to be rather weak did not step up their innovation efforts.

Figure 10: Aggregate innovation expenditure by sector



Note: Values extrapolated from the number of employees. Without businesses with fewer than five employees.

Source: KfW SME Panel, own calculations.

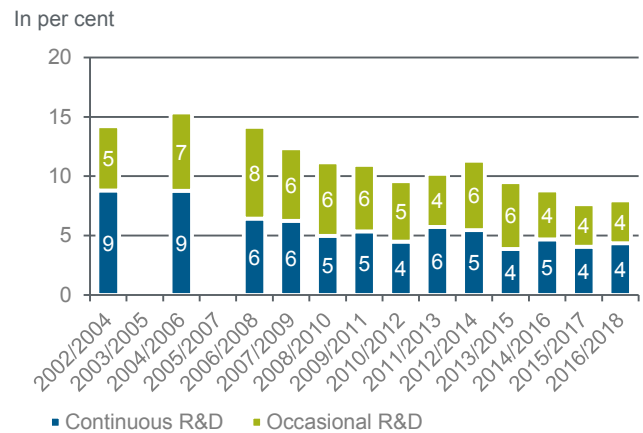
SMEs rarely carry out their own R&D

As mentioned, many innovations by small and medium-sized enterprises are not based on their own R&D. R&D is defined as 'systematic creative work aimed at expanding existing knowledge [...] and using it with the objective of finding new potential applications'.¹⁹ Instead, it is common for SMEs to develop innovations on the basis of experiential knowledge that emerges from the normal production process or in collaboration with customers and suppliers.²⁰

In the period of 2016/2018, a mere 4% of SMEs conducted R&D continuously and a further 4% occasionally (Figure 11). The negative trend of the previous periods thus did not continue in the period under review. In absolute figures, that means some 305,000 SMEs with own R&D activities in total. In terms of innovation activity, that means a total of around two thirds of SMEs introduced new or improved products and processes without conducting their own R&D.

After the economic and financial crisis, the share of SMEs conducting R&D initially dropped for several years and then rose again slightly. Since 2012/2014, however, that share has continuously fallen to now 8%. The proportion of SMEs with their own R&D has thus decreased by around half from the peak of 2004/2006.

Figure 11: Enterprises with research and development activities of their own



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

The decline in SMEs that conduct R&D is also cause for concern because they are, to a certain extent, at the spearhead of innovation in the SME sector. With the high degree of novelty in their innovations,²¹ these enterprises in particular bring new ideas to the market, thereby driving technological progress and structural transformation.

Share of SMEs engaged in R&D is falling across all size classes

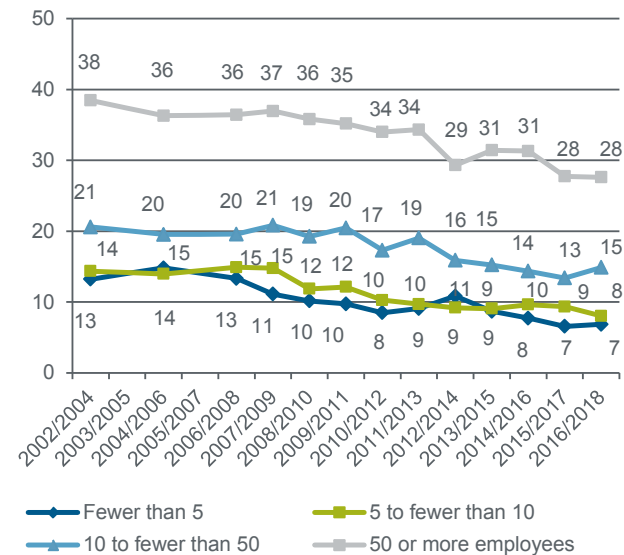
Large SMEs are much more likely to conduct their own R&D than other enterprises. In the period under review, 28% of SMEs with 50 or more employees conducted their own R&D. That share held steady on the previous period. In other words, large SMEs conduct almost twice as much R&D as enterprises with ten to fewer than 50 employees (Figure 12). That proportion is even four times higher than in businesses with fewer than five employees. This is an indication that larger enterprises undertake innovation activities more systematically and make innovation processes more permanent.²² A long-term downward trend in the shares of enterprises conducting R&D, however, can be observed in all size classes.

R&D-intensive manufacturing SMEs conduct own R&D most often

R&D-intensive manufacturers are by far the most active in conducting own R&D, leading all other sectors by a wide margin (Figure 13). Currently, 40% of SMEs in this sector continuously or occasionally conduct R&D of their own. On that basis, their innovator rate was higher than in the other sectors throughout the period under review. Nevertheless, the upward trend has stopped after three consecutive survey periods.

Figure 12: Enterprises with own (occasional or continuous) R&D by size

In per cent



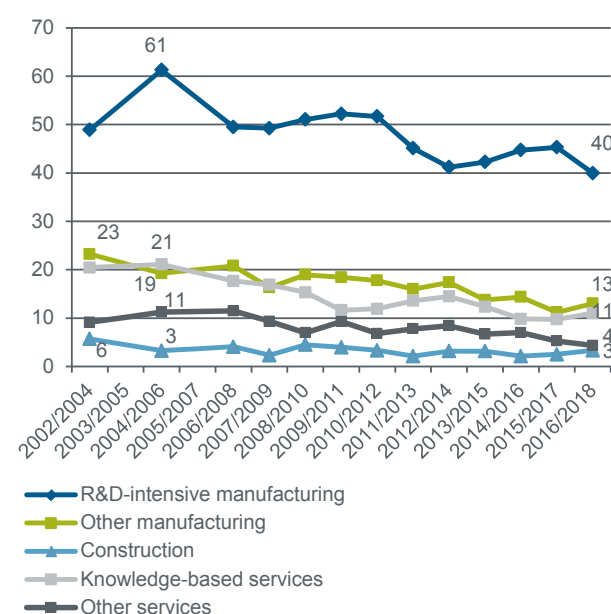
Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

Over much of the period under review, the shares of SMEs conducting their own R&D exhibit few differences between other manufacturing and knowledge-based services. The two sectors rank second and third, with similar values of 13 and 11%. An even lower percentage of other service providers conducts own R&D. R&D is least common in the construction industry.

Figure 13: Enterprises with own (occasional or continuous) R&D by sector

In per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

The sectoral comparison also illustrates that the loss of SMEs conducting R&D is the lowest among knowledge-based service providers and in R&D-intensive manufacturing, at around one third each. Moreover, the R&D-intensive manufacturing sector also exhibits the undulating trend curve in R&D activity that could already be observed for innovation activity.

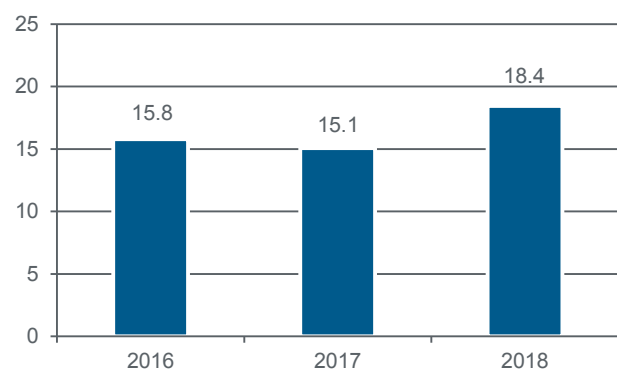
R&D expenditure has increased

Aggregate R&D expenditure in the SME sector amounted to EUR 18.4 billion in the period under review (Figure 14). That was a significant rise on the previous year.

Despite their small number, large SMEs with 50 and more employees account for most of the aggregate R&D expenditure, as is the case with innovation expenditure. With EUR 10 billion out of a total of EUR 18.4 billion, R&D expenditure is concentrated in large SMEs to a similar extent as innovation expenditure. Large SMEs increased their R&D expenditure by more than EUR 1 billion on the previous year. In the period under review, these enterprises' R&D expenditure was on a level between that of 2016 and 2017. In the other company size classes, too, R&D expenditure rose at least moderately – in line with the trend of the previous years (Figure 15).

Figure 14: Aggregate R&D expenditure

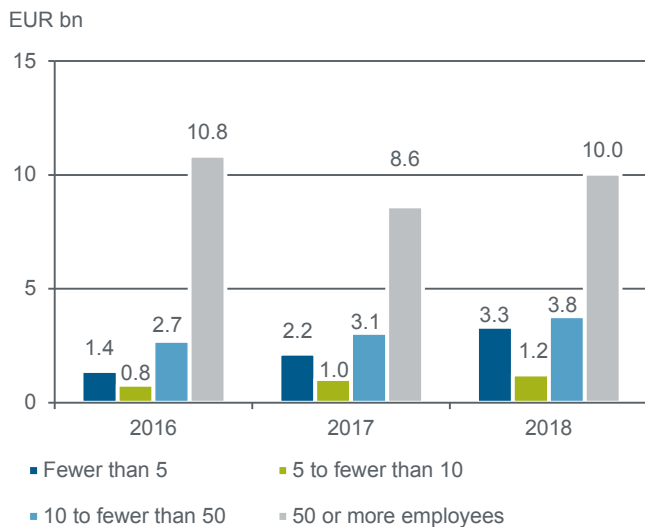
EUR bn



Note: Values extrapolated from the number of employees.

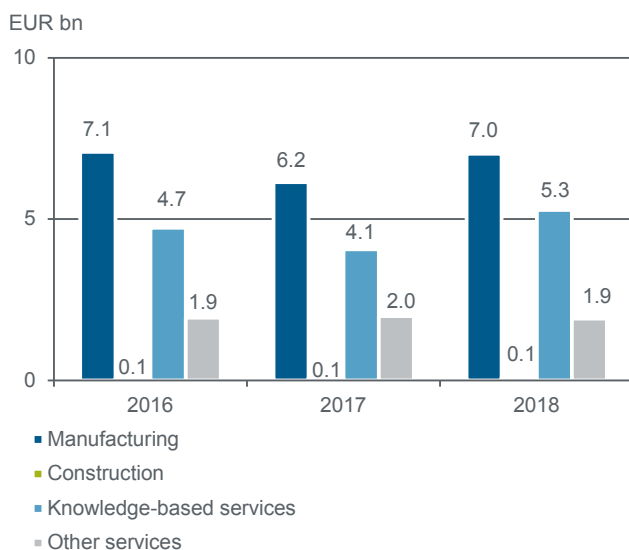
Source: KfW SME Panel, own calculations.

As expected, manufacturers were at the top of all sectors for R&D expenditure, having spent EUR 7 billion (Figure 16). Enterprises in this sector slightly increased their R&D expenditure on the previous year. This also applies to knowledge-intensive service providers. The other sectors, on the other hand, exhibit only minor variations in R&D expenditure on the previous year.

Figure 15: Aggregate R&D expenditure by company size

Note: Values extrapolated from the number of employees.

Source: KfW SME Panel, own calculations.

Figure 16: Aggregate R&D expenditure by sector

Note: Values extrapolated from the number of employees. Without businesses with fewer than five employees.

Source: KfW SME Panel, own calculations.

Conclusion

During the period under review, the innovator rate dropped again noticeably for the second time in a row. With an innovator share of 19%, the proportion of SMEs that introduced new or improved products and processes dropped to the lowest level ever recorded. Since the peak during the 2004/2006 survey period, the share of SME innovators dropped by more than half (-56%). Unlike in the previous year, this was a result of the trend in both product and process innovators. SMEs of all size classes and sectors show declining

innovator rates. The current decline is likely due to the cyclical slowdown, which has mainly dampened the innovation activity of imitative product innovators and SMEs without own R&D activity. Another probable cause may be that many SMEs are currently devoting more effort to digitalisation at the expense of their traditional innovative efforts.

The share of SMEs that conduct R&D, on the other hand, has remained steady on a low level compared with the previous period. Aggregate innovation and R&D expenditure even increased on the previous period. Larger SMEs with ten or more employees are driving this development.

Over the long term, it is primarily small businesses and SMEs with no R&D of their own that have discontinued their innovation activities.²³ At the same time, a steady and even positive development of innovation and R&D expenditure has been identified.²⁴ As a result, a gap is emerging between the bulk of small and medium-sized enterprises tending to discontinue innovation activities and enterprises that are not just continuing but intensifying their innovation activities. Both groups are often distinguished into those with and without own R&D.

R&D and pioneer enterprises need more support

The polarisation into two groups described above has implications for innovation policy. Among other things, efforts must be undertaken to safeguard Germany's technological leadership and occupy new technological areas. It is therefore necessary to further promote the development of new technologies and bolster support for pioneer enterprises. The Federal Government's commitment to raising the share of R&D expenditure to 3.5% of GDP is an important signal in this direction. Strong action is now required to meet this target.

Germany has an elaborate system of measures in place to promote R&D-based innovation. They range from support areas for the high-technology strategy through sectoral programmes to thematically unspecified programmes. They comprise measures for networking and technology transfer. The granting of tax incentives to promote R&D expenditure is a new promotional approach that was recently added after long debate in Germany and has already been successfully applied in the majority of OECD countries. These established promotional schemes need to be endowed with sufficient funds. An international comparison shows that state support for innovation activity in the business sector is rather low in Germany compared with the USA, the UK, France and Italy, for example.²⁵

The support measures referred to above aim to in-

crease research efforts of enterprises that conduct R&D, encourage further businesses to start R&D activities of their own, strengthen knowledge-based sectors and improve the marketing of cutting-edge research. The goal is to maintain Germany's technological pioneering role and safeguard its international competitiveness. Finally, intensifying R&D activities is likely to benefit less innovative SMEs indirectly as well, as customers' demands within the value chain represent an important incentive for these enterprises to innovate.²⁶

Innovation activity needs to be encouraged on a broad scale

In order to counteract the decline in the rate of innovators and strengthen competitiveness across the SME sector, however, it is also necessary to broadly promote innovation activities in predominantly imitative SMEs. These innovators are important because they drive the diffusion of new technologies across the economy. Innovations will not generate economic benefits such as economic growth and the hoped-for renewed increase in productivity until technological progress is realised across the economy as a whole.²⁷

The bulk of these SMEs, however, generate innovations without own R&D. Measures designed to promote R&D will largely fail to incentivise them to start own (R&D-based) innovation activities. This is because their innovation activities are usually based on experiential skills acquired through informal processes of learning and understanding ('learning by doing, using and interacting'). Research has shown that businesses can be successful innovators even without R&D and achieve significant growth.²⁸ For their innovative powers, these enterprises draw on important sources such as the use of external knowledge (e.g. from customers, suppliers and competitors), intensive exchange within the company, the use of management practices that provide incentives to innovate and, not least, an established risk

culture that promotes new ideas and accepts failures. It is a major challenge for policymakers to identify practicable approaches for promoting innovation effectively along these aspects.²⁹ That may have been the reason support programmes geared to advice, human resources development and the use of property rights were scaled back in Germany in the past years – unlike R&D promotion.³⁰

Enterprises that do not conduct R&D can improve their innovative potential by expanding and more effectively organising their learning and innovation processes. That is something which they mainly need to do themselves. State programmes designed to provide support in the areas of organisation and skills, such as access to scientific-technical knowledge, the development of an innovation management system adapted to enterprises' needs, or meeting the need for skilled workers (in these enterprises, typically graduates of the dual vocational education and training system), including support in further training of workers, can provide valuable assistance here³¹.

Finally, many young enterprises generate innovations more often than older enterprises (KfW Research reports separately on the start-up activity of innovative enterprises³²). A sufficient supply of new businesses also bolsters the innovative strength of small and medium-sized enterprises. Technology-oriented start-ups, in particular, have high growth potential³³ and are often first to introduce new scientific findings into the market.³⁴ In this way, they often make great contributions to technological progress and structural transformation. The specific barriers these businesses face therefore need to be addressed in a targeted manner. In addition, more people have to be encouraged to become entrepreneurs in order to generate more businesses of this kind. Teaching entrepreneurial skills and showing income alternatives early are important approaches.

The structure of innovative SMEs in 2016/2018

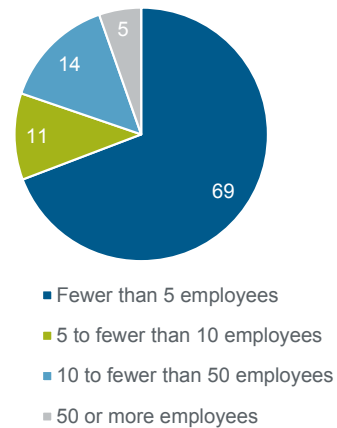
The SME sector, according to KfW's definition, covers all enterprises in Germany whose annual turnover does not exceed EUR 500 million. By this definition, around 3.81 million SMEs exist in Germany. The SME sector thus accounts for 99.95% of all enterprises in Germany. Around 725,000 of these enterprises are innovators.

The majority of innovative SMEs are small enterprises. Most innovative SMEs (around 500,000 enterprises, or 69%) have fewer than five employees. This high proportion of small innovators is due to the overall structure of small and medium-sized enterprises. Eighty-one per cent of SMEs have fewer than five employees. The manufacturing industry accounts for 13% of innovators while the service sector represents 82%.

Sixty-six per cent of innovative SMEs do not conduct any R&D of their own. A mere 17% research continuously and a further 17% undertook own R&D activities only occasionally in the past three years.

Figure 17: Innovative SMEs by company size

In per cent

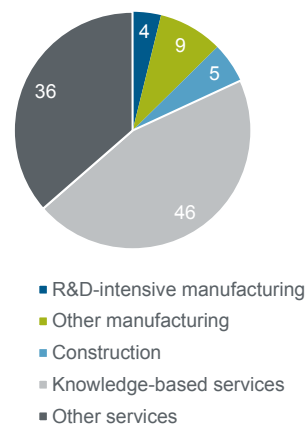


Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

Figure 18: Innovative SMEs by industry

In per cent

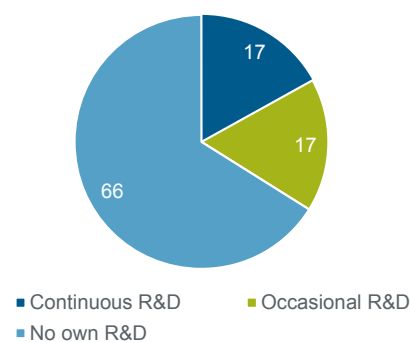


Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

Figure 19: Innovative SMEs by own R&D activity

In per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations.

KfW SME Panel

The KfW SME Panel (KfW-Mittelstandspanel) has been conducted since 2003 as a recurring postal survey of small and medium-sized enterprises in Germany with annual turnover of up to EUR 500 million.

With data based on up to 15,000 companies a year, the KfW SME Panel is the only representative survey of the German SME sector, making it the most important source of data on issues relevant to the SME sector. As it is representative of all SMEs of all sizes and across all branches in Germany, the KfW SME Panel offers projections for even the smallest companies with fewer than five employees. A total of 10,222 SMEs took part in the current wave.

Analyses of long-term structural developments in the SME sector are performed on the basis of the KfW SME Panel. It gives a representative picture of the current situation and the needs and plans of SMEs in Germany. It focuses on annually recurring information on companies' performance, investment activity and financing structure. This tool is the only way to determine quantitative key figures for SMEs such as investment spending, loan demand and equity ratios.

The basic population used for the KfW SME Panel comprises all SMEs in Germany. These include private-sector companies from all sectors of the economy with annual turnover of not more than EUR 500 million. The population does not include the public sector, banks or non-profit organisations. Currently there are no official statistics providing adequate information on the number of SMEs or the number of people they employ. The survey used the German Company Register (Unternehmensregister) and the official employment statistics (Erwerbstätigenrechnung) to determine the current population of SMEs.

The KfW SME Panel sample is designed in such a way that it can generate representative, reliable data that are as precise as possible. The sample is split into four groups: type of promotion, branches, firm size as measured by the number of employees, and region. In order to draw conclusions on the basic population based on the sample, the results of the survey are weighted/extrapolated. The four main stratification criteria are used to determine the extrapolation factors. These factors look at the distribution in the net sample (in line with the four group characteristics) in relation to their distribution in the population as a whole. Overall, two extrapolation factors are determined: an unlinked factor for extrapolating qualitative parameters to the number of SMEs in Germany, and a linked factor for extrapolating quantitative parameters to the number of employees in SMEs in Germany.

The survey is conducted by the Financial Services Division of GfK SE on behalf of KfW Group. The project received expert advice from the Leibnitz Centre for European Economic Research (ZEW) in Mannheim. The main survey of the 17th wave was conducted in the period from 11 February 2019 to 21 June 2019.

¹ Cf. Ulku, H. (2004): R&D, Innovation, and Economic Growth: An empirical Analysis, IMF Working Paper 04/195; OECD (2007) (ed.): Innovation and Growth. Rationale for an Innovation Strategy (<https://www.oecd.org/edu/ceri/40908171.pdf>), retrieved on 16 June 2016 or Westmore, B. (2013): R&D, Patenting and Growth: The Role of Public Policy, OECD Economics Department Working Papers, No. 1047, OECD Publishing, Paris; Dachs, B., Hud, M., Koehler, C., and Peters, B. (2017): Innovation, Creative Destruction and Structural Change: Firm-level Evidence from European Countries, *Industry and Innovation* 2(4):346–381.

² Cf. Bravo-Biosca, A.; Marston, L.; Mettler, A.; Mulgan, G. and Westlake, S. (2013), Plan I – Innovation for Europe, Nesta and the Lisbon Council.

³ Cf. Zimmermann, V. (2017), **Success factors of high-growth enterprises**, Focus on Economics No. 177, KfW Research.
 Zimmermann, V. (2015): **What are the hallmarks of consistently successful businesses?** Focus on Economics No. 113, KfW Research.
 Zimmermann, V. (2015): **KfW SME Innovation Report 2014: Standstill in Europe is slowing down innovation**, KfW Research,
 Zimmermann, V. (2014): Innovation and Employment. Die Beschäftigungswirkung verschiedener Arten von Innovationen in expandierenden und schrumpfenden mittelständischen Unternehmen (*The employment effect of different types of innovation in expanding and contracting SMEs*), *Journal of Business Economics*, ZfB-Special Issue 4/2013 (in German only): p. 131–149, Kritikos, A. S., Hafenstein, M. and Schiersch, A. (2017): Auch kleinste Betriebe stoßen erfolgreich Innovationen an, sie tun es nur seltener (*Micro-businesses, too, stimulate innovation successfully, they just do it less often*), *DIW Wochenbericht* 27, p 755–761 (in German only) and Gerstenberger, J. (2017): **Produktivität des deutschen Mittelstands tritt auf der Stelle – Zeit zu handeln** (*Productivity of German SMEs has flatlined – time to act – in German only*) Focus on Economics No. 172, KfW Research.

⁴ Cf. Aghion, P., Akcigit, U., Hyytinen, A. and Toivanen, O. (2018): On the returns to invention within firms: Evidence from Finland. *The American Economic Association Papers and Proceedings* 108: 208–212.

⁵ Cf. Zimmermann, V. and Thomä, J. (2019), **Interactive learning or R&D: How do small and medium-sized enterprises generate innovations?** Focus on Economics No. 264, KfW Research, or Jensen, M. B., Johnson, B., Lorenz, E. and Lundvall, B. A. (2007): Forms of knowledge and modes of innovation. Research Policy 36(5): 680–693.

⁶ Cf. OECD and Eurostat (2018) (publishers), Oslo Manual 2018. Guidelines for collecting, reporting and using innovation data. OECD Publishing.

⁷ The KfW SME Panel captures whether an enterprise has introduced innovations for a three-year period using the method commonly applied across Europe. Initially the KfW SME Panel surveyed innovative activity only every two years.

⁸ Thus, unlike the innovator rate, the share of SMEs with completed digitalisation projects increased from 26% to 30% from 2014/2016 to 2015/2017. Cf. Zimmermann, V. (2019): **KfW SME Digitalisation Report 2018: Digitalisation has reached broad areas of the SME sector – average expenditure on digitalisation remains low**, KfW Research.

⁹ A rapid spread of innovations can also have negative effects, however. It can reduce the profitability of new-to-market innovations, so that the earnings they generate may be insufficient to recoup the (usually high) development costs. That can lower the incentive to develop new-to-market innovations. Patent laws and other intellectual property rights (e.g. models, copyrights) should therefore provide adequate protection for the interests of pioneer businesses.

¹⁰ Cf. Zimmermann, V. (2017): **SME innovations: Seven reasons for the decline in the share of innovators**. Focus on Economics No. 185, KfW Research, Poschen, K. and Zimmermann, V. (2014): **Falling sales expectations curb SME innovation activity in Germany**, Focus on Economics No. 58, KfW Economic Research; and for more details Zimmermann, V. (2010): Innovation und Konjunktur (Innovation and economic activity). Points of View No. 10, June 2010, KfW Economic Research.

¹¹ Cf. Mansfield, E.; Schwartz, M. and Wagner, S. (1981): Imitation costs and patents: an empirical study, Economic Journal 91, p. 907–918 and Peters, B. et al. (2014): Firm Growth, Innovation and the Business Cycle. Background Report for the 2014 Competitiveness Report.

¹² It must be noted, however, that a new-to-market innovation does not necessarily mean that the product is being offered for the first time in the world. Rather, new-to-market innovation always refers to the market that is relevant for the innovator. Particularly for businesses that operate solely on local markets, new-to-market innovation therefore often cannot be equated to 'new-to-world-market innovation'.

¹³ The number of employees is calculated including the active owners but excluding trainees and apprentices. Two part-time employees are counted as one full-time employee.

¹⁴ Cf. Galbraith, J. K. (1952): American Capitalism. The Concept of Countervailing Power. Boston, Houghton Mifflin, p. 92, Cohen, W. M., Levin, R. C. and Mowery, D. (1987): Firm Size and R&D Intensity. A Re-Examination. Journal of Industrial Economics 35, p. 543–563, or Cohen, W. S. and Klepper, S. (1996): Firm Size and the Nature of Innovation within Industries: The Case of Process and Product R&D. Review of Economics and Statistics 78(2), p. 232–243.

¹⁵ Cf. Schlegelmilch, B. (1988): Der Zusammenhang zwischen Innovationsneigung und Exportleistung (*The correlation between innovation propensity and export performance* – our title translation, in German only). Ergebnisse einer empirischen Untersuchung in der deutschen Maschinenbauindustrie (*Results of an empiric survey of the German engineering industry* – our title translation, in German only), in: Zeitschrift für betriebswirtschaftliche Forschung 50(3), p. 227–269; Greenaway, D. and Kneller, R. (2007): Firm heterogeneity, exporting and foreign direct investment, in: The Economic Journal 117(517), F134–F161, and Wagner, J. (2007): Exports and productivity: A survey of the evidence from firm-level data, in: World Economy 30(1), 60–82.

¹⁶ Cf. Andersson, M. and Löf, H. (2009): Learning by Exporting Revisited – the role of intensity and persistence, in: Scandinavian Journal of Economics 111(4), 893 – 913.

¹⁷ Owing to changes in the structure of the questionnaires, the surveys of innovation expenditure prior to 2013 are not directly comparable with current figures.

¹⁸ This includes expenditure on internal and external research and development (R&D), innovation-related expenditure on machinery, equipment, software and external knowledge (e.g. patents and licenses). It also includes expenditure on product design, construction, service design and preparation for the manufacture and sale of innovations. Expenditure on training conducted in the context of innovations and their introduction into the market is included as well.

¹⁹ Cf. OECD (2015) (ed.): Frascati Manual 2015. Guidelines for collecting and reporting data on research and experimental development.

²⁰ Cf. Zimmermann, V. and Thomä, J.: (2019), **Interactive learning or R&D: How do small and medium-sized enterprises generate innovations?** Focus on Economics No. 264, KfW Research, or Jensen, M. B., Johnson, B., Lorenz, E. and Lundvall, B. A. (2007): Forms of knowledge and modes of innovation. Research Policy 36(5): 680–693, and Thomä, J. and Zimmermann, V. (2019): Non-R&D, interactive learning and economic performance: Revisiting innovation in small and medium enterprises, ifh Working Paper No. 17/2019.

²¹ Cf. Zimmermann, V. (2019): **KfW Innovation Report 2018 – Innovator rate has fallen again**, KfW Research.

²² Cf. Zimmermann, V. (2017): **KfW SME Innovation Report 2016: Innovation is concentrated in increasingly fewer enterprises**, KfW Research.

²³ The reasons for this and possible implications for economic policy have been intensively discussed by KfW Research in the past years. Cf. Zimmermann, V (2018), **KfW SME Innovation Report 2017: Trend towards fewer innovators continues**, KfW Research, Zimmermann, V. (2017), **SME Innovations: Seven reasons for the decline in the share of innovators**, Focus on Economics No. 185, KfW Research, or Zimmermann, V. and Thomä J. (2016), **SMEs face a wide range of barriers to innovation – support policy needs to be broad-based**, Focus on Economics No. 130, KfW Research.

²⁴ Cf. Leibnitz-Centre for European Economic Research (2019): Innovationen in der deutschen Wirtschaft (*Innovation in the German private sector* – our title translation, in German only) and Stifterverband (2019): Forschung und Entwicklung in der Wirtschaft (*Research and development in the private sector* – our title translation, in German only).

²⁵ Cf. Rammer, C. and Schubert, T. (2016): Concentration on the Few? R&D and Innovation in German Firms 2001 to 2013, ZEW Discussion Paper No. 16-005.

²⁶ Cf. Zimmermann, V. (2016): **KfW SME Innovation Report 2015: Germany's innovation performance remains low despite slight increase**, KfW Research.

²⁷ Cf. Schiersch, A. (2019): Frontiers and Laggards. Die Produktivitätsentwicklung deutscher Unternehmen (*Frontiers and laggards. Productivity development of German enterprises* – our title translation, in German only), Bertelsmann Stiftung, and Andrews, D., Criscuolo, C and Gal, P. N. (2016): The best versus the rest: The global productivity slowdown, divergence across firms and the role of public policy, OECD Productivity Working Papers No. 05.

²⁸ Cf. Innovation success of non-R&D performers: substituting technology by management in SMEs. *Small Business Economics* 33(1), p. 35–58, and Thomä, J. and Zimmermann, V. (2019), Non-R&D, interactive learning and economic performance: Revisiting innovation in small and medium enterprises. ifh Working Paper No. 17/2019.

²⁹ Cf. The Distinct Features of Hidden Champions in Germany: A Dynamic Capabilities View. ZEW Discussion Paper No. 19-012.

³⁰ Cf. Fortentwicklung der EFI-Indikatorik: Förderlandschaft. Studien zum deutschen Innovationssystem (*Refining the set of indicators of the Commission of Experts for Research and Innovation: Promotional landscape. Studies on Germany's innovation system* – our title translation, in German only) No. 9-2017.

³¹ Cf. Zimmermann, V. and Thomä J. (2016), **SMEs face a wide range of barriers to innovation – support policy needs to be broad-based**, Focus on Economics No. 130, KfW Research.

³² Cf. Metzger, G. (2020): **KfW Start-up Report 2019: Number of start-ups in Germany continues to grow**, KfW Research, and Fernández Acevedo, M. et al (2016) **France, Germany, Italy, Spain and the United Kingdom: Building Momentum in Venture Capital across Europe Building Momentum**, KfW Research.

³³ Cf. Zimmermann, V. (2017): **Success factors of high-growth enterprises**, Focus on Economics No. 177, KfW Research.

³⁴ Cf. Niefert, M. and Zimmermann, V. (2009): Die Dynamik im Innovationsverhalten kleiner und mittlerer Unternehmen (*The dynamics in innovative behaviour of small and medium-sized enterprises* – our title translation, in German only), in: KfW, Creditreform, IfM, RWI and ZEW (eds.), *Deutsche Wirtschaft in der Rezession – Talfahrt auch im Mittelstand (German economy in recession – SMEs also tumbling* – our title translation, in German only). *Mittelstandsmonitor 2008 – jährlicher Bericht zu Konjunktur- und Strukturfragen kleiner und mittlerer Unternehmen (SME Monitor 2008 – annual report on economic and structural issues of small and medium-sized enterprises* – in German only). p. 107–134.