

KfW SME Innovation Report 2014

Standstill in Europe is slowing down innovation

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Innovation is a precondition for sustained growth. The new KfW SME Innovation Report 2014 shows that innovation also plays a role in determining business success. Turnover and employment grow around two-fifths faster in innovative businesses than in businesses that do not innovate. Innovation increases the profit margin by 7% within two years.

Still, SMEs' innovative activity has slowed for the third consecutive year. The current 28% share of innovative SMEs (2011/13) is even lower than in the 2007/09 period, which was heavily affected by the financial and economic crisis. The number of innovative SMEs has dropped by 51,000 to 1.01 million companies against the previous period alone.

The recent decline was triggered by weak actual growth and growth expectations, which creates uncertainty for businesses over sales and prices. The standstill in Europe especially is slowing down the placing of innovations. R&D-intensive manufacturing enterprises in particular (e.g. engineering, electronics, pharmaceuticals), as well as large SMEs and those with international operations, are abandoning the group of innovators (-6 and -3 percentage points, respectively, against 2010/12). The overall economic outlook for 2015 gives no reason to hope for innovative activity to pick up again.

In a long-term analysis, however, it is not so much the highly innovative enterprises that have lost innovative strength. Rather, since the middle of the last decade innovative activity has decreased in those market segments where innovation is generally a less

important element of business strategy, contracting by 39% in small enterprises (with fewer than five employees) and by 38 to 43% in the construction and services sector. The reason for this is increasing price competition, which leaves little room for the development of innovations because of strong pressure to reduce costs and low margins being anticipated – as a result of intensive price competition – (see Box 2 – The most important results at a glance).

From a macroeconomic perspective, innovation and technical progress are the main drivers of long-term, sustainable growth and increasing prosperity.¹ In addition to education, they also improve the use of resources, accelerate structural change, enable the production of high-quality products and services and so boost an economy's competitiveness on the global markets. In particular, with innovation also comes hope for the crea-

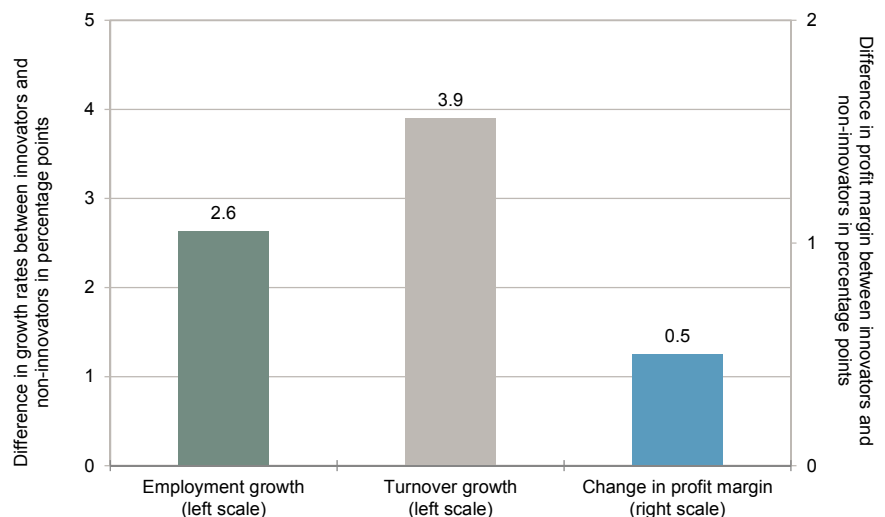
tion of employment.

New and improved products and production processes are important mechanisms that enable enterprises to secure their own position against competitors, expand their market share and increase profits. Innovation not only refers to developments based on research activity, such as the anti-lock braking system or the CNC milling machine, but also, for example, the introduction of e-commerce, 24-hour on-call duty or after-sales service. To be classified as an innovation, what is relevant is whether the product (or service) or the production process (or the service provision method) is new for the company in question.

Innovation improves business performance

A special analysis conducted by the KfW SME Panel provides clear evidence of the positive effect innovation has on business performance. Within only two

Figure 1: Effect of innovation on business performance



Note: Figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

years after introducing an innovation, the sales turnover generated by innovative companies is on average 3.9 percentage points higher than that of non-innovative companies (Figure 1). As part of their higher value creation, employment grows faster as well, by 2.6 percentage points. In relation to the average growth of 10.4% in turnover and 6.1% in employment achieved by the companies in the survey sample, the growth rate of innovators is generally around two fifths faster than that of companies that do not innovate. Innovation also increases profitability. On average across all SMEs, after two years innovative enterprises achieve a profit margin that is already 0.5 percentage points higher than before. Given the mean profit margin (in the sample) of 7.4%, this means an increase of almost 7% (see Box 1 for methodology).

Innovation is a catalyst for growth in many companies

The positive impacts of innovation on business growth can be seen across a broad spectrum of enterprises. In the manufacturing and service sector, sales turnover increases by 3.4 to 7.3 percentage points and employment growth

Table 1: Effect of innovation on business performance by industry

	Sales growth	Employment growth	Profit margin
	Difference in growth rates between innovators and non-innovators in percentage points		Difference in profit margin between innovators and non-innovators in percentage points
R&D-intensive manufacturing	5.7	2.2	0.2*
Other manufacturing	3.4	2.1	0.7
Construction	1.9*	-0.1*	-0.2*
Knowledge-intensive service providers	7.3	4.2	0.4*
Other service providers	3.7	3.5	0.6

Note: * Statistically non-significant

Source: KfW SME Panel, own calculations

is between 2.1 and 4.2 percentage points, depending on the economic activities analysed.³ Only in the construction sector are the impacts lower (Table 1). Turnover growth in the construction industry was calculated at 1.9 percentage points. This rate and the employment growth rate are, however, within the margin of statistical uncertainty of the

survey, so an effect of innovation on the growth of construction firms cannot be regarded as certain.⁴

The development of profitability is more heterogeneous. With increases of 0.6 and 0.7 percentage points respectively, the innovation effect and the profit margin are positive in non-R&D-intensive manufacturing (e.g. food industry, manufacture of metal products, rubber and synthetic products) and in the non-knowledge-intensive service sector (e.g. wholesale trade, hospitality, transport and storage).⁵ In the remaining industries, however, it is not possible to establish a (statistically) significant effect of innovation on the profit margin.

Innovation is not restricted to market novelties

Products and services are often classified as either market novelties or imitative innovations or imitations. Whether ships' propellers, portable music players or caffeinated soft drinks: inventions are often marketed by a pioneering company as a 'market novelty'. However, market novelty does not necessarily mean that the product is being offered for the first time in the world. Rather, market novelty refers to the 'relevant' market. So from the perspective of a baker in Hamburg, offering lye pastries that are baked in accordance with the original Swabian recipe is a market novelty if none of the

Box 1: Regression analysis of innovation and business performance

In order to determine the influence of innovation activity on performance indicators (sales, employment and profit margin), we take into account whether a company has implemented product or process innovations in a three-year period. The impact of innovation on business performance is measured on the basis of the company's development in the following two-year period.

Products or processes are classified as innovations if they are considered by the company introducing them to be new or to have been improved in significant ways against predecessor products or processes.

In order to isolate the influence of the innovative activity on the corresponding performance indicator, the following characteristics are taken into account in the regression equations: number of employees (in FTEs), age of company (both logarithmised), employment of university graduates, international sales, industry in which the company operates, year of survey, group to which the company belongs, legal status, KfW support status and region of company's registered office. All time-varying company characteristics refer to the date immediately preceding the start of the period under review to measure business performance.

The analysis made use of least-squares regressions. It may incorporate six surveys conducted by the KfW SME Panel. They cover the innovation periods 2002/2004, 2004/2006, 2006/2008, 2007/2009, 2008/2010 and 2009/2011. Depending on the specification of the estimation equation, the survey is based on 13,500 to 20,300 observations of 6,700 to 9,100 companies. The fact that several observations come from one company is taken into account in computing the standard errors.²

Box 2: The most important results at a glance

- **Innovative SMEs grow faster and achieve higher profits**
 - Both turnover and employment grow around two fifths faster than in other companies
 - Profit margin increases by 7 % against non-innovative enterprises within two years
 - Market novelties drive business growth more than anything – but with a higher risk of failure
 - Process innovations create employment and lead to turnover growth as well
- Weak economy is further slowing down innovation activity in the SME sector
 - Product imitations in particular are sensitive to cyclical swings; market novelties and process innovations are more stable over the long term
 - Problems in Europe affect highly innovative businesses most of all
 - R&D-intensive manufacturing (proportion of innovators -6 percentage points against 2010/12).
 - Large and international SMEs (proportion of innovators -3 percentage points against 2010/12)
- Long-term trend: proportion of innovators has dropped by more than one third to 28 % (since 2004/06)
 - Strong decline in product innovations; minor drop in process innovations
 - Particularly affected: small businesses (fewer than five employees: -39%) and the construction and service sector (-38 to -43 %)
 - SMEs that carry out R&D occasionally and small enterprises are discontinuing their own R&D work
- Rising competitive pressure is generally bad for innovation
 - Competitive pressure is dominated by rising price pressure, which prevents innovative activity
 - Technology competition leads to more innovation but only in few industries
- Possible intervention areas of economic policy
 - The challenge ‘crisis in the euro area’ is important for the most innovative enterprises
 - Specific obstacles to innovation faced by SMEs must be addressed more urgently (financing problems, bureaucratic obstacles, securing the supply of skilled workers)

baker's (local) competitors is already offering such pastries.

Taking over ‘inventions’ from competitors is referred to as imitative innovation or imitation. Thus, from the Tablet PC to beer brewed using the Pilsner brewing technique to the bob hairstyle: imitations represent the bulk of all products and services being offered. The dissemination of new developments in particular is important from a macroeconomic point of view because it ensures both greater efficiency in the use of resources and competitiveness across the overall economy. The benefit of imitative innovations for the consumers is that as the number of suppliers rises, the price of the new product usually falls. A negative effect of imitations is that they may generally result in fewer market novelties. The reason is that imitations make the introduction of market novelties less profitable because a pioneering enterprise

will achieve lower earnings to cover its (high) development costs.⁶

Market novelties lead to strong business growth

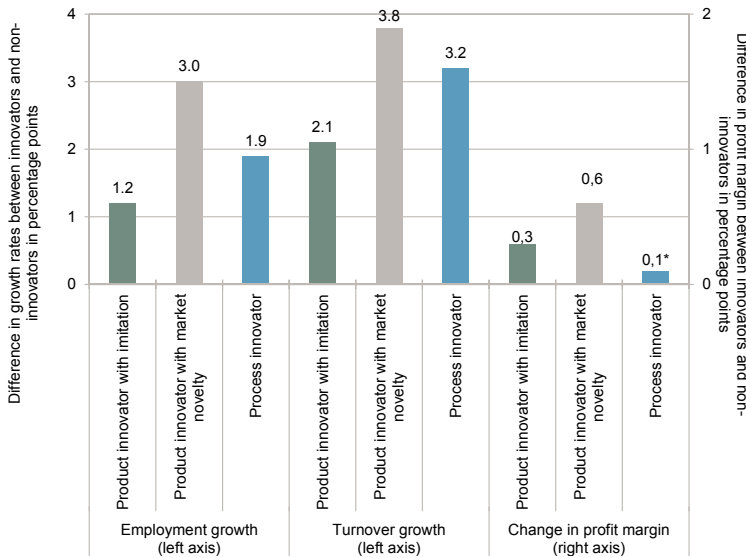
The effect of innovation on business performance varies according to the type of innovation. Market novelties deliver the strongest growth impetus for sales and employment growth, with an average 3.8 and 3.0 percentage points respectively (Figure 2). This is because the entire demand focuses on that one innovative company. As product imitations lack a unique selling proposition, the growth effect is correspondingly lower (2.1 and 1.2 percentage points respectively).⁷

A market novelty provides an opportunity but is also fraught with higher risk. It is uncertain whether the product will succeed on the market. In contrast, an imitation strategy provides the advantage of reduced risk – apart from the generally

lower development costs. Thus, a larger group of companies benefits from the positive growth effects of imitations. A recent analysis conducted by the KfW SME Panel has identified positive employment effects in more than two thirds of companies that make product imitations. For market novelties this effect occurs in only a good two fifths of companies.⁸

The growth effect of process innovations lies between these two poles, at 3.2% for turnover and 1.9% for employment. Process innovations, which are often viewed as ‘job killers’, create jobs across a broad range of SMEs.⁹ Unlike with product innovations, it is not possible to identify a (statistically established) increase in the profit margin for process innovations. This is an indication that process innovators use the cost savings they achieve primarily to increase or stabilise their market share.

Figure 2: Effect of innovation on business performance by type of innovation



Note: * Statistically non-significant

Source: KfW SME Panel, own calculations

Share of innovators continues to decline

Despite these positive effects, in just seven years the share of innovators has fallen drastically by more than one third against its peak in 2004/06. Currently only 28% of SMEs have undertaken innovations (2011/13).¹⁰ This means that the share of innovators has declined for the third consecutive year (Figure 3) and is even lower than it was in the 2007/09 period, which was strongly affected by the financial and economic crisis. The number of innovative SMEs dropped by 51,000 to now 1.01 million companies against the previous period.

Product innovation is at an all-time low, process innovation is trending downward

The negative trend is mainly due to developments in enterprises that provide new or improved products and services (product innovators). Their proportion has dropped by one quarter against the high of 2004/06. Within the last three years alone, the proportion of product innovators has fallen by five percentage points and is now at 21%, the lowest value since the surveys began. Compared with the previous period, this means around 15,000 fewer SMEs are bringing product innovations to market.

In contrast, the proportion of enterprises with process innovations has varied

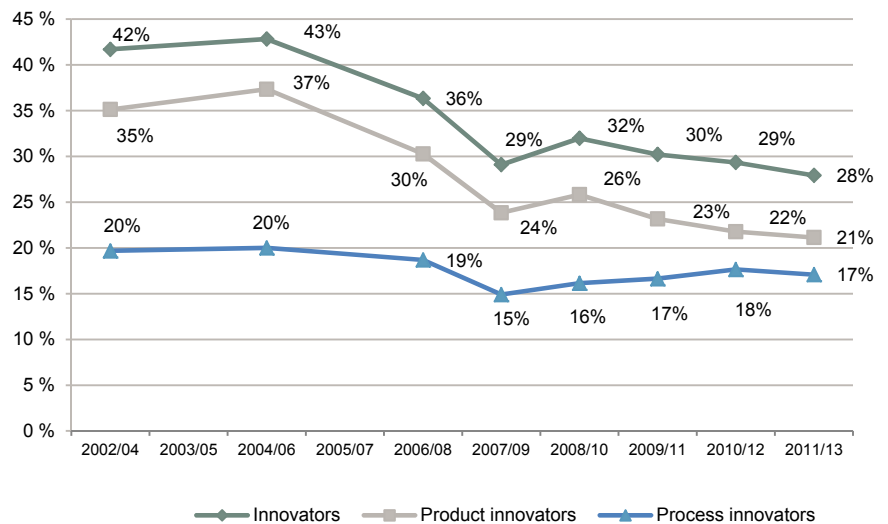
much less over time. The process innovator share has fallen by only one sixth against 2004/06. In the preceding years, process innovations had even trended positively and so nearly offset the slump caused by the financial crisis. Recently, however, process innovations have declined as well. The share of enterprises using new or improved processes dropped by one percentage point against the previous year and is now at 17%. This means that around 14,000 fewer companies modernised their production processes in 2011/13.

Weak economy is slowing down innovation activity

One reason for the unsatisfactory development of the share of innovators is the weak growth in recent years and the rather pessimistic medium-term business expectations reflected in the KfW SME Panel, for example. While the balance of business expectations was still 32 points for the 2010/2012 period (time of survey: spring 2010), it dropped to a mere 15 points for the 2014/2016 period (time of survey: spring 2014).¹¹

However, the state of the economy does not affect all innovations equally. Product innovations are probably heavily dependent on economic trends because they are more likely to succeed on the market when demand is increasing. Imitations that are relatively fast to implement, in particular, are realised when business expectations are positive. What also plays a role is that both the development and the market introduction of innovations are generally easier to finance when the economy is performing well. In contrast, process innovations respond only little to the economic environment. Economic trends probably have less impact because new processes are often introduced into the company in combination with the manufacture of new products. However, particularly in times of weak economic performance there is

Figure 3: Changes in the proportions of innovators among SMEs



Note: Figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

likely to be pressure to introduce process innovations that reduce costs, so that enterprises forego the introduction of new processes less often than the introduction of new products.¹²

Imitative innovations depend heavily on economic trends

The strong responsiveness of imitative product innovations to cyclical developments already became apparent between 2004/06 and 2007/09, when they dropped particularly sharply by 42%. After the share of imitative product innovations fell continuously by six percentage points from 2008/10 to 2010/12, this share has now stabilised at 17%, slightly higher than in the previous period (Figure 4).

Market novelties are longer-term projects

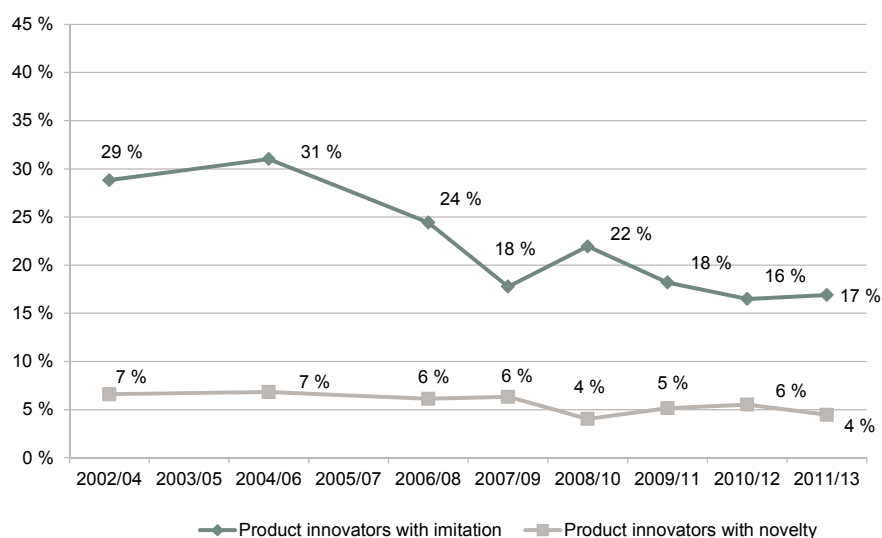
Market novelties often require high innovation expenditure and significantly longer development phases. This is why they are usually planned for the long term and for strategic reasons. The timing of market novelties, however, is not entirely independent from cyclical developments either. Particularly in periods of economic weakness, when demand is weak and financing is typically more difficult to obtain, companies are likely to shy away from introducing market novelties that are fraught with particular risk.¹³

Accordingly, the proportion of enterprises with market novelties appears to correlate only little with the cyclical situation. Only in the wake of the economic and financial crisis did a gap of -2 percentage points become apparent for market novelties as well but this gap was almost completely closed by the time of the previous year's survey period. The share of SMEs with market novelties has dropped by two percentage points lately as well. In absolute figures, the number of SMEs that developed (product) market novelties has dropped by some 38,000.

Loss of innovative companies is a long-term trend

The current decline in innovative companies can therefore be partly explained by the weak economy. However, this should not hide the fact that a clear negative trend exists which is independent from

Figure 4: Product innovators – market novelties and imitations



Note: Figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

the economic environment. Since the middle of the last decade, the innovative activity of SMEs has dropped in all size categories surveyed here (Figure 5).

The smaller a company is, the stronger the decline in innovative output. In companies with fewer than five employees¹⁴ the proportion of innovators has fallen by two fifths since 2004/06 (peak level). Among large SMEs with 50 and more employees, on the other hand, the decline is minus one sixth.

The generally more constant development of innovation activity by large enterprises across cyclical and crisis cycles is probably due to the fact that, among other things, the need for process innovations, which are comparatively less responsive to economic cycles, rises with increasing company size. Moreover, innovative processes are more constant in large enterprises. In contrast, small enterprises often seize market opportunities that appear suddenly and bring imitative product innovations to the market more frequently.

Small companies innovate less because they have fewer resources

The generally stronger innovation activity of large enterprises can be explained by their advantages in the innovation process. They have broader market coverage, incur less risk by pursuing several

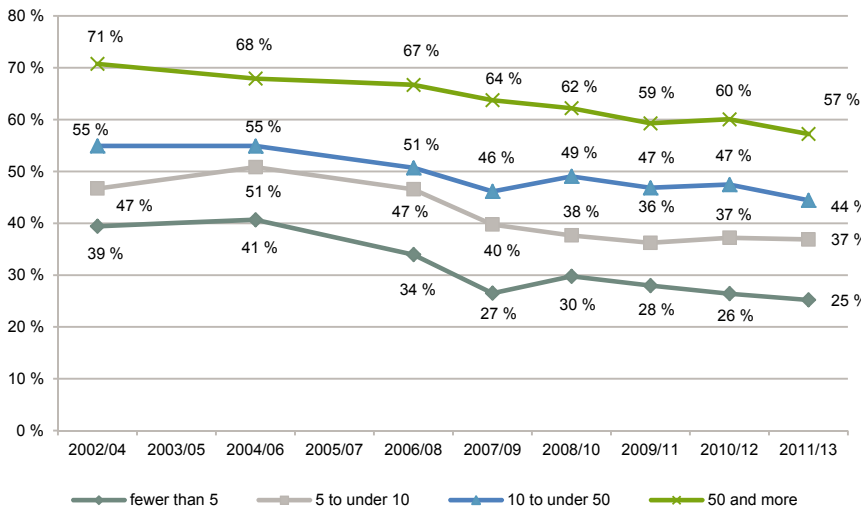
innovation projects at the same time and have size advantages from the multiple use of new developments. Besides, innovation projects often cannot be split up at will. With minimum project sizes and high fixed costs, innovations place a relatively higher financial strain on small enterprises than on large ones.¹⁵

For small enterprises it is therefore far more difficult to finance innovation projects from company profits than it is for large enterprises. The specific characteristics of innovation projects make it harder for them to obtain bank loans. These characteristics include high uncertainty regarding project success and a low proportion of fixed assets. Furthermore, the financing volumes requested by SMEs are comparatively low from the viewpoint of external lenders, which often makes lending unprofitable for them unless they demand correspondingly higher returns. Although bank loans are now easy to obtain for planned investments, it is particularly small enterprises and companies with technologically demanding projects that have difficulty supplementing their scarce internal resources with external funding.¹⁶

Growth weakness in Europe is slowing down innovation activity

Currently, however, the sharpest drop in innovation activity, by 3 percentage points, has occurred in SMEs with 10

Figure 5: Share of innovators by company size



Note: Figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

tional activities.

The pronounced innovative activity of SMEs with international business is due to the intensive technology competition on these markets. Strong innovative efforts are indispensable in order for them to remain competitive. This is also reflected in the development of market novelties in particular. The proportion of SMEs with international activities that generate (product) market novelties has grown from 8 to currently 11% since 2006/08. The proportion of such enterprises with purely German business has dropped from 9 to 5% in the same period. For enterprises that generate sales exclusively in the region of their registered office, market novelties generally play a minor role, with levels between 1 and 3% (Figure 7).

R&D-intensive manufacturing industry defies long-term downward trend

The analysis by sector shows that in the long term the proportions of innovation have dropped most significantly in the construction and service sectors. Since the middle of the noughties, the proportion of innovators in the knowledge-intensive services (e.g. law firms, tax accountants and management consulting firms, IT and information service providers), the remaining services and the construction industry has declined by roughly two fifths (Figure 8).

and more employees. This is likely to be the result of weak growth in the European environment, which is a more important sales market especially for large SMEs (of the R&D-intensive manufacturing sector).

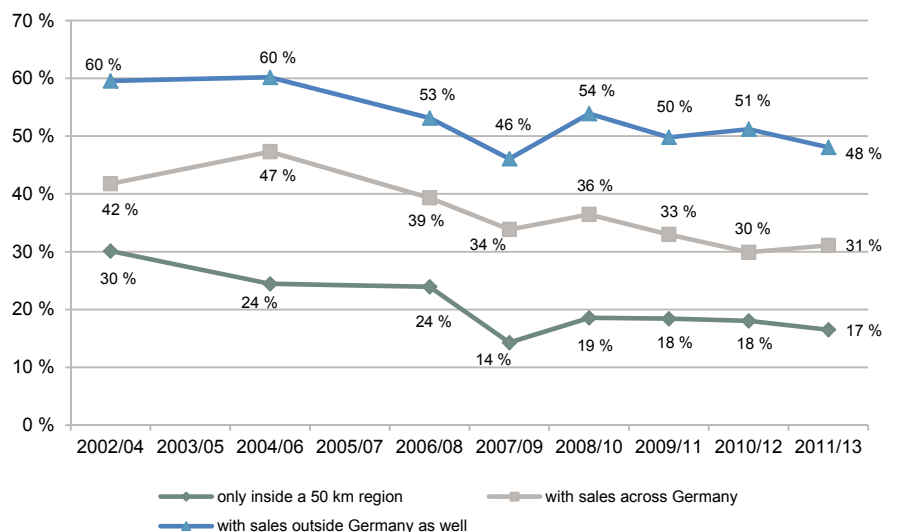
The development of innovator proportions as a function of the relevant company's sales region confirms this. Currently the proportion of innovators is declining significantly more steeply – by 3 percentage points – among companies with foreign sales than among companies operating exclusively on the domestic market (Figure 6). The stagnation that has persisted in Europe for years is now beginning to adversely affect the innovation activity of SMEs operating on foreign markets as well.

International SMEs: the pillar of innovative activity

Over the whole observation period, however, internationally operating enterprises show themselves to be a pillar of innovative activity in the SME sector. SMEs that operate on international markets generate new or upgraded products and production processes most frequently. In this context, German SMEs that compete globally view their own innovative performance critically in comparison with their competitors and regard their future potential as under threat.¹⁷

The proportion of innovators among SMEs that generate part of their sales abroad was on the decline before the economic and financial crisis. This proportion had stabilised at levels above 50% between 2008/10 and 2010/12 before the current trend became apparent in the euro area. The proportion of innovators is significantly lower among enterprises operating regionally and across Germany. Moreover, the proportion of innovators among companies operating throughout Germany has also fallen more sharply since the middle of the last decade than among SMEs with interna-

Figure 6: Share of innovators by sales region



Note: Figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

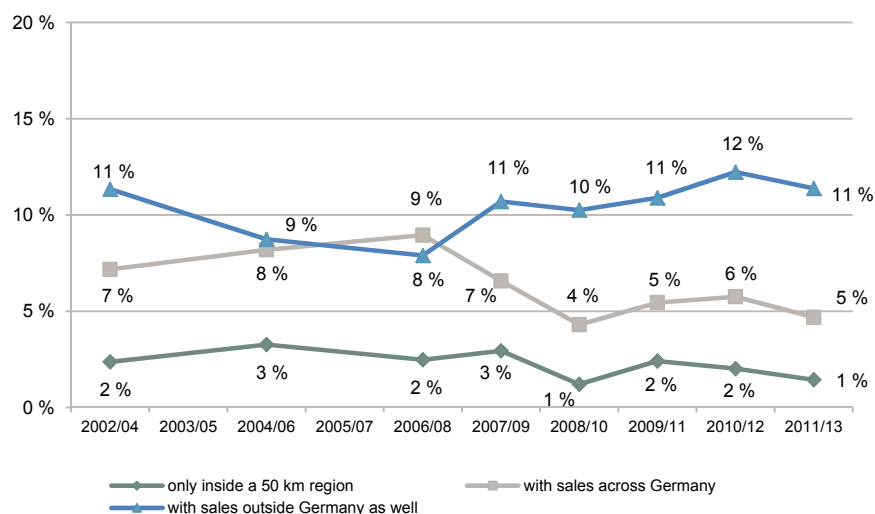
In manufacturing, on the other hand, the decline is much more moderate. The share of companies with new products or processes has fallen by one quarter in the remaining (non-R&D-intensive) manufacturing industry since 2004/06. R&D-intensive manufacturing even defied the general downward trend. Except during the slump following the economic and financial crisis, the proportion of innovators remained nearly stable up to the previous year's survey. Thus, a long-term decline in innovative activity is evident, particularly in those sectors that already engaged in little innovative activity during the first half of the last decade.

Own research and development as a source of innovation

Especially in SMEs, innovations often emerge out of the normal production process or in close interaction with customers and suppliers. Own research and development (R&D), on the other hand, tends to be rare because of limited resources. In the 2011/13 period, 4% of SMEs conducted their own R&D occasionally and a further 6% conducted research and development continuously over this three-year period. Accordingly, today 71% of innovators are companies that do not conduct R&D activities of their own (see Box 3 – Comparison of R&D and innovation expenditure).

Nevertheless, a close connection exists between a company's own R&D work

Figure 7: Companies with market novelties by sales region



Note: Figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

and its innovation results. Companies that conduct R&D bring forth innovations more frequently and usually pursue innovation strategies aimed at occupying the role of precursors.¹⁸ Companies that conduct research continuously are particularly successful at building up expertise among their employees, which is then available for them to successfully implement further innovation projects.

R&D activities in the SME sector are declining

In the previous decade, the share of companies that conducted R&D occa-

sionally was still as high as 8% (2006/08); that of companies conducting research continuously reached 9% (2002/04 to 2004/06). The current figures are 4 and 6%, respectively (Figure 9).

All company size categories show declining shares of companies engaged in R&D. In particular, SMEs that conduct R&D occasionally and small enterprises are discontinuing their own R&D activities.

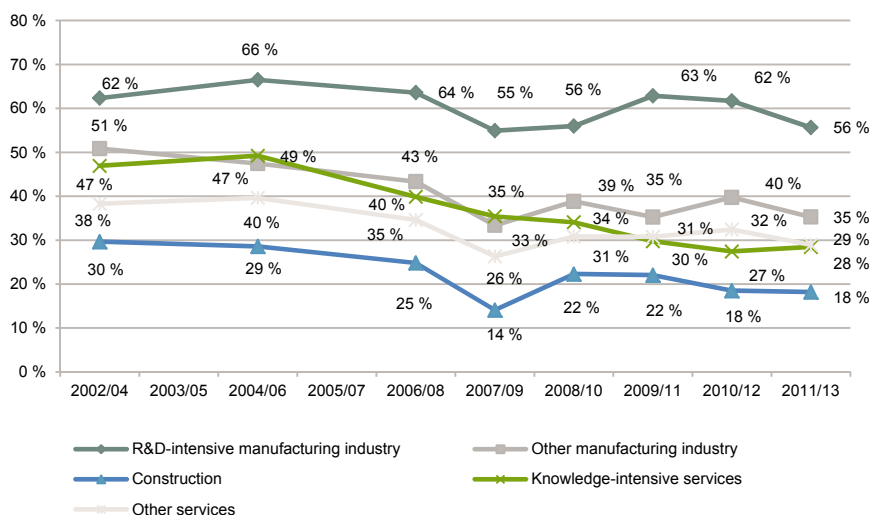
An analysis by sector also shows a long-term trend of decreasing proportions of enterprises conducting R&D mainly among those that conduct research occasionally. This particularly applies to the service sector and (lately) the remaining manufacturing industries.

Competition is becoming more intense

What reasons could be put forward for the long-term trend of declining innovation and R&D activities? One possible explanation – one that appears surprising at first glance – is that a decline in innovation is caused by, of all things, more intense competition.

In the 2012 survey of the KfW SME Panel, two thirds of SMEs reported that competition had become more intense in the preceding five years.¹⁹ Almost four out of five enterprises – and thus the vast majority of SMEs – reported that

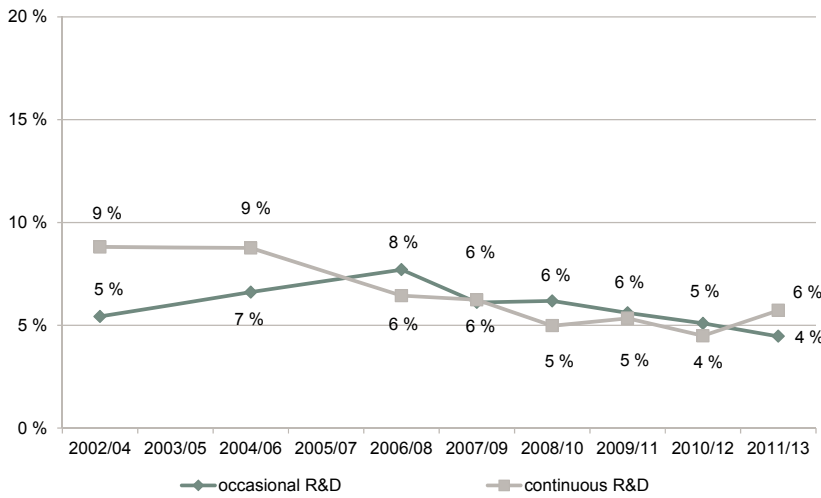
Figure 8: Share of innovators by industry



Note: Figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

Figure 9: Companies with R&D activities of their own



Note: Figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

this meant increasing price pressure (Figure 10).

Higher demands on flexibility and responsiveness were the second and third most formidable challenges, reported by well over half of SMEs, while increased competition was still reported by a good one third of SMEs. In contrast, only one out of every eight enterprises noted an increase in technology competition.

Price competition hampers innovation

However, increasing price competition does not cause the affected enterprises to step up their innovation efforts but instead often puts higher pressure on them to be more efficient and tends to force price adjustments and cost reductions. An enterprise that is exposed to increasing price competition is 15% less likely to bring forth an innovation than an enterprise not so exposed (Figure 11).

The fact that small enterprises in particular (those with fewer than 10 employees) reduce their innovation activity amid price competition is probably due to the disproportionately high financial burden their own innovative activity places on them. High development and market introduction costs and an expectation of low margins – resulting from intense price competition – make innovation activity an unattractive business-policy option. Intense price competition adversely

affects the creation of both product innovations and process innovations. The development and market introduction of product innovations is the first activity that enterprises cut back on.

On the other hand, higher demands on flexibility and shorter planning horizons encourage the introduction of new production and manufacturing processes, which is hardly surprising. A shorter

planning horizon also prompts enterprises to step up their efforts to develop new products. When planning horizons are shortened, it is possible that enterprises prepare for shorter product life cycles and move the further development of their product ranges forward. By contrast, it is not possible to establish whether intensified quality competition has a (statistically) significant effect on innovative activity (see Box 4 on methodology).

Strongest driver of innovation: technology competition

Technology competition has by far the strongest positive impact on the innovation activity of small and medium-sized enterprises as it increases their likelihood of innovating by 45%. The positive effects occur regardless of company size and apply to the creation of both product innovations and process innovations. Product innovations are particularly driven by technology competition.

Market segment determines type of competition

Whether an enterprise is exposed more to increasing price competition or more to technology competition mainly depends on the sector in which it operates (Figure 12). Increasing price pressure

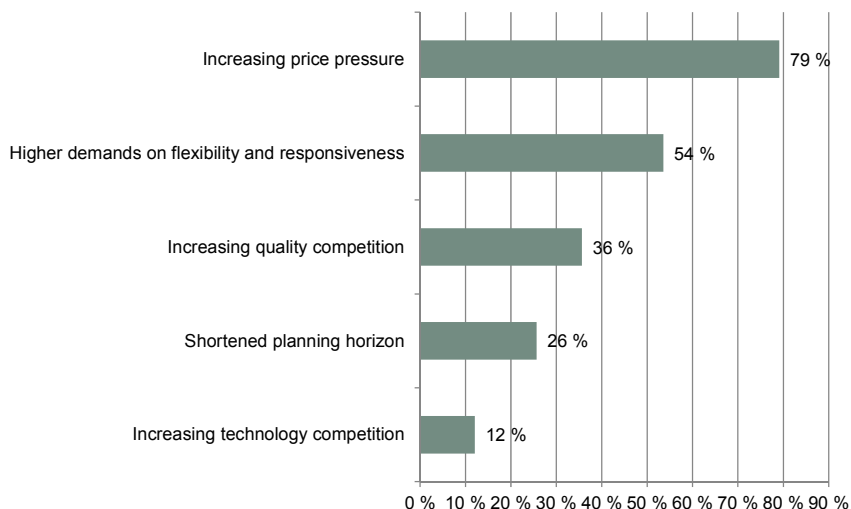
Box 3: Comparison of R&D and innovation expenditure

Innovation expenditure covers all expenditure including personnel costs and capital expenditure in connection with the development and introduction of product and process innovations. 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, as well as expenditure on training measures conducted in the context of innovations and their market introduction.

Thus, R&D is a subset of a company’s innovation activities. According to the standard definition, it is characterised by the creation of new knowledge. The Frascati Manual defines R&D as ‘creative work undertaken on a systematic basis in order to increase the stock of knowledge’.²⁰ Among innovative activities, R&D work is marked by the highest level of complexity and uncertainty of success. Companies conducting R&D on a continuous basis and with high intensity can therefore be expected to be at the forefront of technological development.

Accordingly, R&D expenditure is only a part of innovation expenditure in the SME sector. In the context of the KfW SME Panel, SMEs reported having spent EUR 20.9 billion on research and development in 2013. In contrast, their cumulative innovation expenditure totalled EUR 36.7 billion.²¹

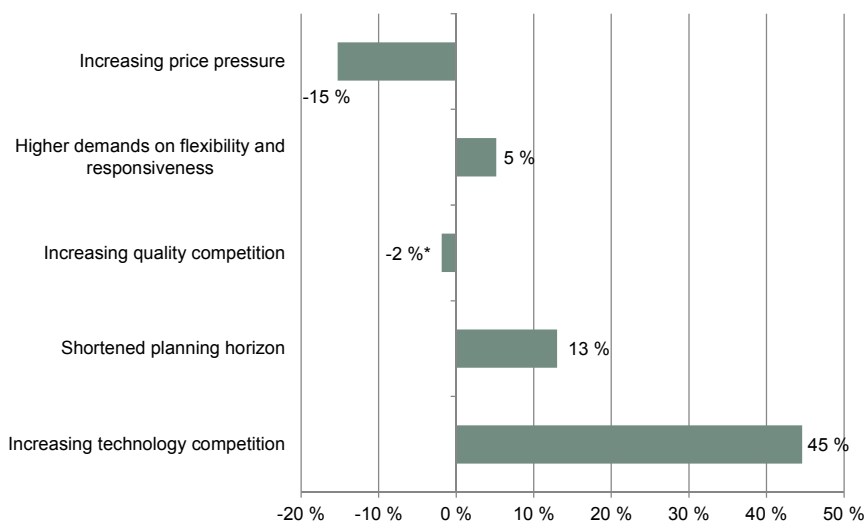
Figure 10: Consequences of intensifying competition



Note: Multiple answers were possible, figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

Figure 11: Impacts of intensifying competition on innovation probability



Note: * Statistically non-significant; model calculation based on regression results;

Source: KfW SME Panel, own calculations

prevails in all sectors, with values between 71 and 88%. However, price competition plays a less important role in sectors that are also characterised by pronounced technology competition. The finding that it is precisely in R&D-intensive manufacturing and, with some exceptions, in the knowledge-intensive service sector that technology competition is most prevalent corroborates the fact that the technological possibilities available to an enterprise for the development of innovations – along with cus-

tomers' preferences – are strongly determined by the sector in which it operates.

In reference to the trend decline of innovation efforts undertaken by SMEs in recent years, Figure 12 shows that innovation activities were reduced particularly in those sectors where increased price pressure is most frequently mentioned. That confirms the negative correlation between price pressure and the creation of innovations, also at sector level. It ap-

plies to other manufacturing industries, construction and other services (Figure 8).

Knowledge-intensive services occupy a special position in this context as they are scaling back their innovation efforts despite relatively low price pressure. The reason is that enterprises providing knowledge-intensive services – just like small enterprises – seldom respond to price competition with innovations or by opening up new markets. Rather, knowledge-based service providers more often invest in the quality of existing products and services and specialise in narrower market segments.²²

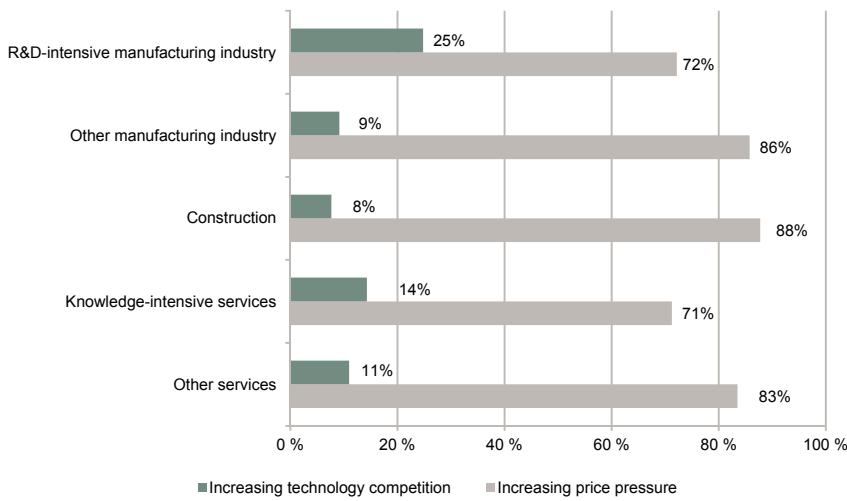
Conclusion

Despite their positive impacts on business performance, innovation efforts in the SME sector have been declining for years. One reason for the current decline, in addition to specific obstacles that often hamper the innovation activity of small enterprises in particular, is the weak current and expected economic growth, which is primarily due to the stagnation in Europe. Furthermore, increasing price competition (over the long-term trend) is limiting the possibilities for bringing forth innovations.

Therefore, an economic turnaround is needed to reverse the trend of innovation activity in the SME sector. Improvements in individual business situations as well as positive and solid sales expectations form the basis for the market introduction of innovations. Thus, all measures that contribute to overcoming the crisis in the euro area and to overall economic stabilisation are an important pillar of innovation activity.

It is also evident that more competition does not automatically mean more innovation. Increasing price competition is an expression of market circumstances and customer preferences which can be influenced by economic policy only to a limited extent and only in the medium to long term. Furthermore, in order to encourage SMEs to undertake enhanced innovation efforts in spite of efficiency pressure and low margins, economic policy needs to address the specific innovation obstacles faced by SMEs. The following innovation obstacles were identi-

Figure 12: Rising price pressure and technology competition by industry



Note: Figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

ous review of legal norms and administrative procedures to determine their necessity can contribute to more innovation.

- Recruiting and retaining skilled employees entrusted with innovation functions is a challenge, particularly for larger SMEs that want to innovate. Given the demographic trend in Germany and the high importance SMEs attribute to qualified employees as carriers of expertise,²⁵ in future this aspect will probably become even more relevant as a means of securing companies' long-term competitiveness. Measures for training and continuous professional development therefore are becoming increasingly important from the aspect of innovation promotion as well. ■

fied in recent studies based on the KfW SME Panel.²³

• Financing difficulties are the number one obstacle to innovation in the SME sector. The internal financing capacity of enterprises improves when the economy picks up. Furthermore, possible points of intervention for economic policy could be business taxation, improving access to external financing and specific innovation finance measures.

Nevertheless, an unfavourable economic environment is not the only cause of problems in the financing of innovation. These problems are much rather a manifestation of market failure because of the specific characteristics of innovation projects, such as high uncertainty over their (commercial) success, a low proportion of fixed assets and special project size requirements.²⁴ As these instances of market failure could be directly addressed by economic policy measures to promote innovation finance, they have a particularly prominent role to play in stimulating innovation. Innovation finance is a continuous task of innovation policy.

• SMEs often perceive legal and bureaucratic regulations as an obstacle to their own innovative activity. A continu-

Box 4: Regression analysis of type of competition and innovation

In order to determine the effect of the various consequences of increased competition intensity (rising price pressure, high demands on flexibility / responsiveness, increasing quality competition, reduced planning horizon, increasing technology competition) on the development of innovations, we examined whether a company that has identified one of the consequences of competition listed above in the past five-year period has implemented product or process innovations in the past three-year period.

In order to isolate the effect which the impacts of competition have on innovation activity from other effects, the following characteristics are taken into account in the regression equations: number of employees (in FTEs), age of company (logarithmised), employment of university graduates, international sales, industry to which the company belongs, group to which the company belongs, legal status, KfW support status and region of company's registered office.

The analysis made use of a probit model on the basis of the 2012 survey of the KfW SME Panel. It was based on close to 6,500 company responses.

The regression results are illustrated using model calculations in Figure 12. These model calculations are based on a reference company with certain characteristics. The reference company belongs to 'other manufacturing', has five to 10 employees and generates sales abroad. It is located in the western German federal states, does not employ any university graduates, is not part of a group of companies and has not been supported by KfW. The age of the company reflects the mean age of the sample. Furthermore, the company is not affected by any of the impacts of increased competition.

A company thus defined has a 45.5% probability of generating innovations. The effect which one of the above-listed impacts of competition has on this probability can now be illustrated by assuming the company is affected by a specific impact of competition against the reference company and calculating the then applicable innovation probability, with all other company characteristics remaining unchanged.

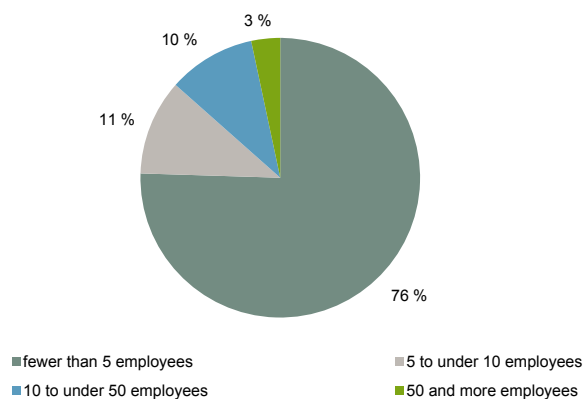
The structure of innovative SMEs in 2013

The SME sector covers all enterprises in Germany whose annual turnover does not exceed EUR 500 million. According to this definition, there are around 3.61 million SMEs in Germany today. Of these, 1.01 million are innovators.

The majority of innovative SMEs are small enterprises. The majority of innovative SMEs (763,000 enterprises, or 76%) have fewer than five employees. This high proportion of small innovative SMEs is due to the overall structure of small and medium-sized enterprises, as 86% of all SMEs have fewer than five employees. The manufacturing industry accounts for 10% of innovators while the service sector represents 83%.

Seventy-one per cent of innovative SMEs do not conduct any R&D of their own. Only 17% of innovators conduct research continuously while 12% undertook some R&D activities in the past three years.

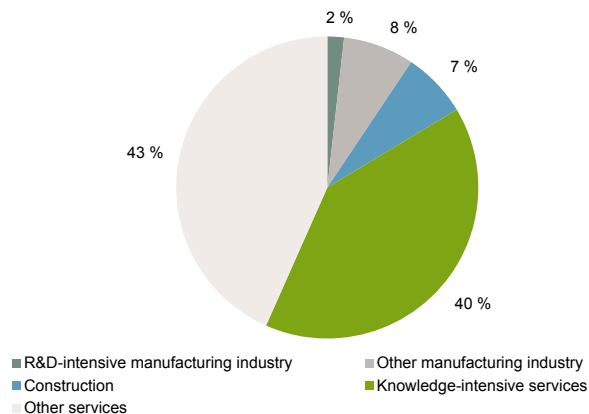
Figure 13: Innovative SMEs by company size



Note: Figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

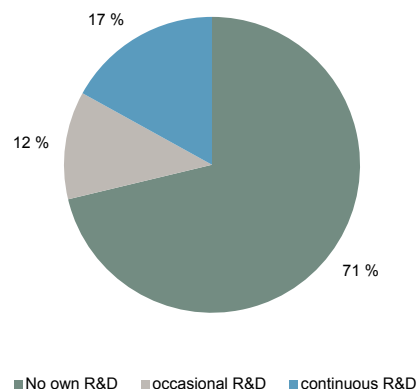
Figure 14: Innovative SMEs by industry



Note: Figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

Figure 15: Innovative SMEs by own R&D activity



Note: Figures extrapolated to the number of companies

Source: KfW SME Panel, own calculations

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

With a database of up to 15,000 companies per year, the KfW SME Panel is the only representative survey of the German SME sector and thus 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 industries in Germany, the KfW SME Panel offers the possibility to conduct **projections for micro-businesses with fewer than five employees as well**. A total of 10,515 SMEs took part in the recent wave.

The KfW SME Panel provides the basis for analyses of long-term structural developments in the SME sector. The KfW SME Panel gives a **representative picture** of the current situation and of the needs and plans of SMEs in Germany. It focuses on annually recurring information on companies' performance, investment activity and financing structure. This tool offers the unique opportunity to determine quantitative key figures for SMEs such as investment spending, demand for credit and equity ratios.

The KfW SME Panel covers a population consisting of all SMEs in Germany. This includes private-sector companies from all industries with annual turnovers of up to EUR 500 million. It does not include the public sector, banks and non-profit organisations. Currently there are no official statistics that adequately capture the number of small and medium-sized enterprises or the number of people they employ. The 2014 survey used the German Company Register (Unternehmensregister) and the official employment statistics (Erwerbstätigenrechnung) to determine the population of SMEs in 2013 and the population of SME employees in the same year.

The KfW SME Panel sample is designed in such a way that it can generate representative, reliable and very precise statements. The sample is split into four stratification groups: type of promotion received, industry to which the enterprise belongs, company size category by number of employees, and region. The results of the survey are weighted or extrapolated in order to be able to make inferences from the sample to the parent population. The four main stratification criteria are used to determine the extrapolation factors. These factors set the distribution of the net sample (in accordance with the four group characteristics) in relation to their distribution in the parent population. 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 market research division of GfK SE on behalf of KfW Bankengruppe. The project received expert advice from the Centre for European Economic Research (ZEW) in Mannheim. The main survey of the 12th wave of the KfW SME Panel was conducted in the period from 1st February 2014 to 30th May 2014.

¹ Cf. Borger, K.; Lüdemann, E.; Zeuner, J. and V. Zimmermann (2013): Solving the demographic problem, KfW Economic Research. Focus on Economics, November 2013.

² Cf. Huber, P. J. (1967): The behaviour of maximum likelihood estimates under non-standard conditions, Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability 1: 221–233, and White, H. (1982), Maximum Likelihood Estimation of Misspecified Models, Econometrica 50: 1–25.

³ The identified differences in employment and turnover growth rates are within the margin of statistical uncertainty of the survey. A statistically significant higher turnover growth can be confirmed only for the knowledge-based service industries. Thus, an F-test conducted to determine if the underlying regression coefficients for knowledge-based and other services are equal rejects the corresponding null hypothesis [$F(1, 8,756) = 6.70$].

⁴ I.e. the underlying regression coefficients proved to be statistically insignificant.

⁵ R&D-intensive manufacturing includes, for example, engineering or the production of office and data processing equipment. Knowledge-intensive sectors in the service industry include IT and information providers, architecture firms, consulting engineers, law firms, tax accountants and management consultants.

⁶ Particularly in market segments where it is difficult to protect innovations from imitation, e.g. because new products are quickly copied or the underlying technical knowledge is easily absorbed by outsiders, the level of innovation activity is then insufficient from a macroeconomic perspective. Therefore, providing adequate intellectual property rights (e.g. patents, utility models, copyrights) is a task of innovation policy. The aim of such policy is to enable the positive overall economic effects generated by the distribution of new developments in the economy to be realised without unduly reducing the incentive for companies to work on new developments themselves.

⁷ F-tests conducted to determine if the underlying regression coefficients for product imitations and market novelties are the same reject the corresponding null hypothesis that the coefficients are equal [$F(1, 8,408) = 2.98$; employment growth: $F(1, 8,819) = 5.46$].

⁸ Cf. Zimmermann, V. (2013): Innovation und Beschäftigung. Die Beschäftigungswirkung verschiedener Arten von Innovationen in expandierenden und schrumpfenden mittelständischen Unternehmen [*Innovation and employment. The employment impact of different types of innovation in expanding and contracting small and medium-sized enterprises*], Journal of Business Economics, ZfB Special Issue 4/2013: 131–149.

⁹ Cf. Zimmermann, V. (2012): Führen Innovationen im Mittelstand zu mehr Beschäftigung? [*Do innovations in SMEs lead to more employment?*] KfW Research Standpunkt No. 17, May 2012.

¹⁰ The KfW SME Panel captures the proportions of innovators for a three-year period using the method commonly applied across Europe. Initially the KfW SME Panel surveyed innovative activity only every two years.

- ¹¹ Cf. Schwartz, M. (2014): KfW SME Panel 2014. SMEs feeling the impact of weak growth in Europe, and bracing for harder times ahead, KfW Research
- ¹² Cf. Poschen, K. and V. Zimmermann, (2014): Falling sales expectations curb SME innovation activity in Germany, KfW Research, Economics in Brief No. 58, 13th October 2014. In more detail Zimmermann, V. (2010): Innovation und Konjunktur [*Innovation and economic output*]. KfW Economic Research. Standpunkt No. 10, June 2010.
- ¹³ Cf. Peters, B. et al. (2014): Firm Growth, Innovation and the Business Cycle. Background Report for the 2014 Competitiveness Report.
- ¹⁴ 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.
- ¹⁵ Cf. Zimmermann, V. (2014): KfW SME Panel 2013: Innovation. Are SMEs finally in the starting blocks? KfW Research. Focus on Economics No. 42, 30th January 2014.
- ¹⁶ Cf. Zimmermann, V. (2014): KfW SME Panel 2013: How German SMEs finance their innovations. KfW Research. Focus on Economics No. 50, April 2014 and Zimmermann, V. (2012): Barriers to Innovation in SMEs. KfW Economic Research. Focus on Economics No. 6, September 2012.
- ¹⁷ Cf. Abel-Koch, J. und J. Gerstenberger, (2014): KfW Competitiveness Indicator 2014: International comparison of SMEs' competitiveness – German SMEs remain in leading group. KfW Research.
- ¹⁸ Cf. Zimmermann, V. (2012): To be the Leader of the Pack? Innovation strategies in the German SME sector. KfW Economic Research. Focus on Economics Nr. 11, November 2012.
- ¹⁹ Cf. Schwartz, M. (2013): Tough climate for SMEs: competition increases, the three 'I's promise success. KfW Research. Focus on Economics No. 27, 22nd August 2013.
- ²⁰ Cf. OECD (2002): Frascati Manual 2002 – The Measurement of Science and Technological Activities for Surveys on Research and Experimental Development. Proposed Standard Practice for Surveys on Research and Experimental Development.
- ²¹ Because of modifications made to the survey, these figures are not comparable with those of previous waves of the KfW SME Panel.
- ²² Cf. Zimmermann, V. (2013): The innovation motor is sputtering: Innovation activities in the German SME sector KfW Research. Focus on Economics No. 13, 9th January 2013.
- ²³ Cf. for example Zimmermann, V. (2014): KfW SME Panel 2013: Innovation. Are SMEs finally in the starting blocks? KfW Research. Focus on Economics No. 42, 30th January 2014 or Zimmermann, V. (2012): Barriers to Innovation in SMEs. KfW Economic Research. Focus on Economics No. 6, September 2012.
- ²⁴ Cf. Zimmermann, V. (2014): KfW SME Panel 2013: How German SMEs finance their innovations. KfW Research. Focus on Economics No. 50, April 2014.
- ²⁵ Cf. Zimmermann, V. and J. Thomä, (2012): Innovationsschutz im Mittelstand: Strategien und deren Bestimmungsfaktoren [*Protecting Innovations in SMEs: strategies and their determinants*], KfW Research. Points of View No. 16, March 2012.