

KfW Research

# KfW SME Innovation Report 2015

»» Germany's innovation performance  
remains low despite slight increase

## **Imprint**

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## Germany's innovation performance remains low despite slight increase

After innovation activity in the small and medium-sized enterprise sector fell significantly in the past years, the share of innovators recently increased again to 29 %. Nevertheless, the proportion of innovators is still at the second lowest level since 2004. Thus, a recovery to the pre-financial crisis levels of more than 40 % is still out of reach. The number of innovative SMEs has increased by 35,000 to now 1.05 million companies against the previous period.

One of the factors that have likely contributed to the long-term trend of lower innovation activity is rising price competition. Another development that probably plays a role is that employee age has risen in the past years.

What triggered the recent increase, on the other hand, is probably the performance of the economy. Particularly small enterprises with fewer than five employees and knowledge-based service providers have increased their innovative output. Manufacturers and large, internationally operating enterprises, in turn, have failed to reach their usually high innovative performance for the second consecutive year.

The long-term decline in innovation activity is also reflected in enterprises' turnover. In 2004, 43 % of SMEs were still able to generate more than half their turnover with their innovations. That share has now dropped to 31 %. Conversely, the share of SMEs that generate only up to 10 % of their turnover with innovations has risen from 30 to 53 %.

Research and development activity has also declined. At present, 11 % of SMEs conduct their own research and development activities, compared to 16 % in the period from 2004 to 2006.

More enterprises supplement their own limited resources with external expertise. A good one fourth of enterprises collaborate with other enterprises or research institutes in developing innovations. Preferred partners for cooperation are customers, who account for 41 %, followed by suppliers of machinery and software (29 %). Of the SMEs working with partners, 13 and 10 % collaborate with universities and non-university research institutes, respectively.

Even more important than partnerships are external stimuli for innovation. Eighty per cent of enterprises receive suggestions for innovation projects from external sources, with customers, the trade press, Internet media and competition monitoring playing an important role.

Financing difficulties continue to be the number one obstacle to innovation in the SME sector. This remains the case despite a generally improved equity position and a favourable financing environment. As for innovative SMEs and enterprises that were entirely prevented from innovating because of obstacles, 39 and 36 %, respectively, deplore a lack of internal and external financing sources.

In order for the positive trends in innovation performance to solidify into a trend reversal, the German economy will have to continue to recover significantly. Other points where economic policy can make an impact are the specific obstacles that are in the way of innovation by SMEs. Financing restrictions, difficulties in recruiting specialised staff, bureaucratic hurdles and problems in the areas of organisation and skills hamper successful innovation activity in the SME sector.

Innovation is an important driver of growth and prosperity.<sup>1</sup> The upcoming leap into the digital economy now requires enterprises large and small to undertake increased innovation efforts. For many enterprises it will therefore be important to introduce new and improved products and manufacturing processes to be able to stand up to increasing competition. Numerous studies have confirmed the positive effect of innovation on business performance.<sup>2</sup> Innovation does not only mean developments based on research activities such as industrial robots or driver assistance systems. It may also mean the introduction of a 24-hour on-call service or an express bus line. A product (and a service) or manufacturing process is regarded as an innovation when it is new to the enterprise adopting it.

### Slight increase in innovation activity

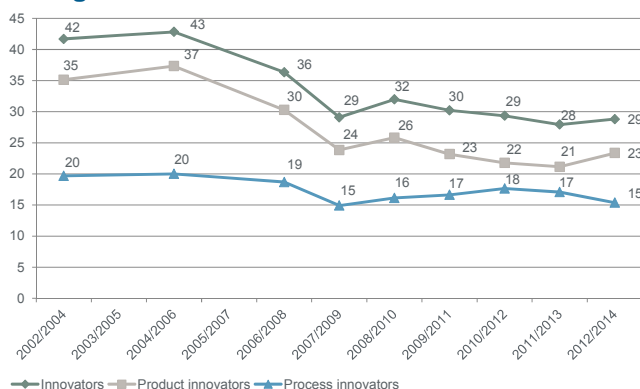
The share of innovators<sup>3</sup> in the SME sector increased by nearly one percentage point to 29 % (2012/2014) (Figure 1). The number of enterprises that brought forth innovations thus rose by 32,000 on 2011/2013. The small and medium-sized enterprise sector includes a total of 1.05 million innovators.

The slight increase in the share of innovators that can currently be observed should not obscure the fact that the proportion of SME innovators is a good one third below the peak registered in 2004/2006.

The moderate latest increase in the share of innovators can be attributed to the variation among product innovators. Their share increased by around two percentage points to now 23 %. This rise was likely triggered by the incipient economic recovery. The share of process innovators, in turn, dropped for the second consecutive year to now 15 %.

The share of process innovators has thus dropped again to its historic low during the financial crisis (2007/2009). As large enterprises perform process innovations more often than small ones, the drop in the number of process innovators is probably associated with the decline in large SMEs' innovation activity.

**Figure 1: Changes in the proportion of innovators among SMEs**



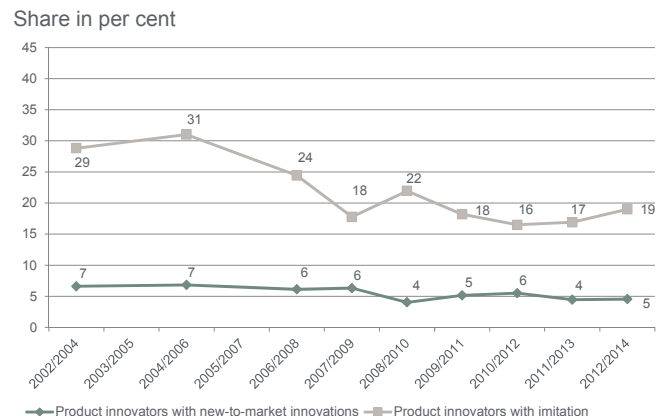
Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

### Economic recovery mainly supports imitative innovations

The economic recovery positively impacts product innovations because new products and services penetrate the market particularly easily when demand increases. It also makes it easier to finance development and market introduction. Companies introduce imitative innovations that can be implemented relatively fast particularly when business expectations are good.<sup>4</sup> Accordingly, the share of SMEs that introduced product imitations to the market increased for the second consecutive year to now 19 % (Figure 2).

**Figure 2: Product innovators – new-to-market innovations and imitations**



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

### New-to-market innovations stabilised on a low level

New-to-market innovations<sup>5</sup> are often planned for the long term and for strategic motives. They usually require high innovation expenditure<sup>6</sup> and longer development phases.<sup>7</sup> The proportion of enterprises with new-to-market innovations therefore fluctuates only slightly across the economic cycle. After the decline in the period 2011/2013, the proportion of enterprises with new-to-market innovations has recovered only slightly by 5 %. This points to a stabilisation on a low level.

### Innovation activity has decreased in all size classes

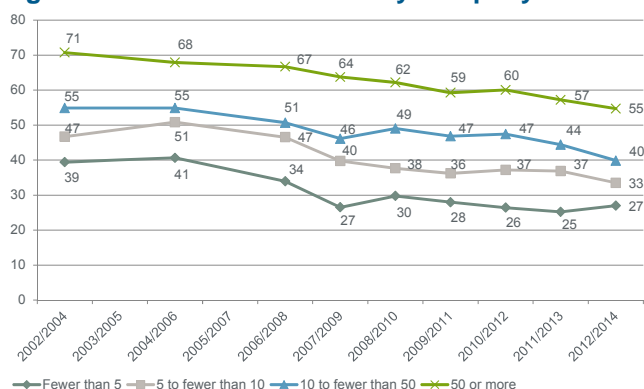
SMEs' innovation activity has dropped in all size classes since the middle of the last decade (Figure 3). The smaller a company is, the greater the decline. The share of innovators among enterprises with fewer than five employees<sup>8</sup> dropped by nearly one third since 2002/2004. The size class of enterprises with more than 50 employees, by contrast, had a good one-fifth fewer innovators.

This seems paradoxical because the current increase in innovation activity among SMEs is exclusively the result of a slight upward trend in the smallest enterprises. Over the long term, however, they have been the group that is making the biggest strides to abandon innovation.

### Growth weakness in Europe is still slowing down innovation activity

At the current margin, on the other hand, it is precisely the big SMEs with more than ten employees that have limited their innovation activity. One reason for this is



**Figure 3: Share of innovators by company size**

Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

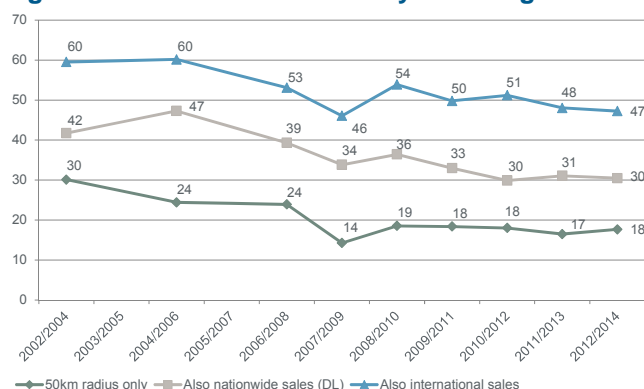
likely to be the continuing weak economic development in Europe, which is affecting especially enterprises with international sales and their suppliers. In the R&D-intensive manufacturing sector in particular (e.g. engineering, electronics, pharmaceuticals), sales expectations have declined in recent years.

The development of innovator proportions as a function of the relevant company's sales region confirms this (Figure 4). It was precisely the share of innovators among enterprises with international sales that fell by a total of -4 percentage points in the past two years. By contrast, the proportion of innovators among regionally operating enterprises in particular showed hardly any variations the last five surveys.

Thus, of all classes it is the enterprises with international business, the mainstay of SME innovation, that are faltering. This is the group that most often generates new or upgraded products or production processes because they face stiff technological competition. They are therefore the ones that depend most on innovative activity to remain competitive.

### Less innovative sectors are generally in a long-term decline

All sectors display the pattern that groups of enterprises in which innovators declined most significantly in the long term have recently recovered slightly. This applies, for example, to knowledge-based services (e.g. IT and information service providers, law firms, tax accountants and management consulting firms) in which the share of innovators rose again for the second consecutive year. Innovation activity stabilised in the construction sector as well, at least on a low level. The proportions of innovators in both sectors declined by a total of one third since the beginning of the 2000s (Figure 5).

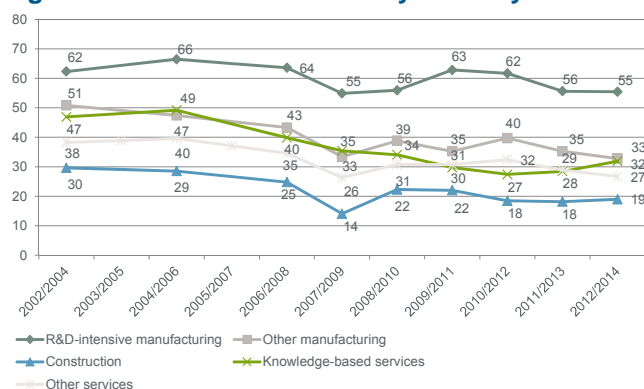
**Figure 4: Share of innovators by sales region**

Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

### R&D-intensive manufacturing industry defies long-term negative trend

In contrast, the long-term decline in R&D-intensive manufacturing was more moderate. This sector long defied the general downward trend. With the exception of the slump following the economic and financial crisis, the proportion of innovators remained nearly stable up to the period of 2010/2012. In the past two years, on the other hand, innovation slowed particularly in manufacturing and other services.

**Figure 5: Share of innovators by industry**

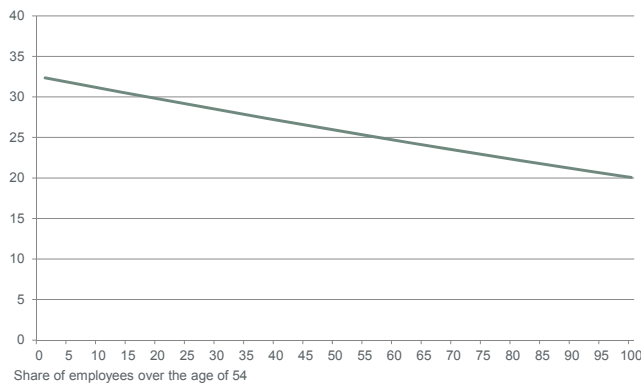
Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

Thus, a long-term decline in innovation activity is evident particularly in those sectors and enterprise sizes that generated fewer innovations already at the beginning of the last decade. The causes for this are not yet conclusively established. What could be of relevance is that increasing competition intensity is reflected primarily by growing price pressure, particularly in construction and other services (e.g. hospitality, transport and storage) but also in other manufacturing industries (e.g. food and animal feed production, textile production) (see Zimmerman 2015 for analysis).<sup>9</sup> This rather increases the pressure to lower prices and reduce

costs instead of encouraging innovation.

**Figure 6: Probability of bringing forth innovations depending on the share of employees over the age of 54**



Note: Model calculation based on regression results

Source: KfW SME Panel, own calculations

### Declining turnover shares with new products

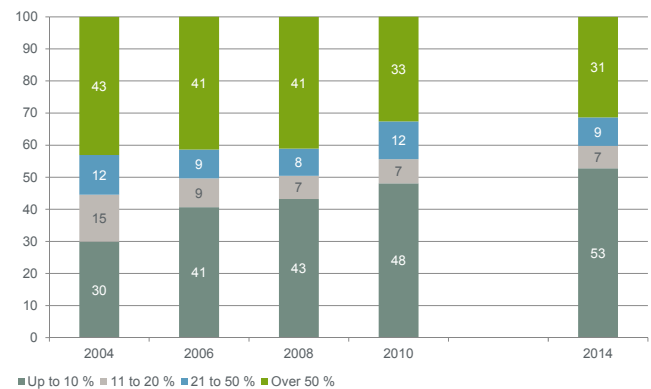
The current decline in innovation activity is reflected in the up-to-dateness of SMEs' product range (Figure 7). The turnover shares that were achievable with innovations have decreased continuously over the past ten years. In 2004, 43 % of SMEs were still achieving more than half of their turnover with new products or services. That proportion has now dropped to a mere 31 %. What has increased significantly, on the other hand, is the proportion of enterprises that generate no or not more than 10 % of turnover with new products. In 2004 these enterprises made up only 30 % of SMEs, but now their proportion is 53 %.

Significant differences are evident in the development of the economic sectors (Figure 8). What is pleasing is that the proportion of innovation-intensive enterprises in the manufacturing sector increased up to 2008. The economic and financial crisis then caused a noticeable turnaround. After 2010 the proportion increased again to 29 %. However, that was not sufficient to achieve the same turnover with innovations as before the crisis.

The group of enterprises with a low share of innovation turnover has to be viewed critically as well. In the manufacturing sector it increased from 34 % in 2004 to 48 % in 2014.

The trend in the service sector is even more negative. The share of enterprises with a high innovation turnover ratio declined continuously. Since 2004 their share dropped from 45 to 32 %. At the same time the share of enterprises with a low innovation turnover ratio almost doubled from 28 to 52 %.

**Figure 7: Change in new products as a percentage of turnover**

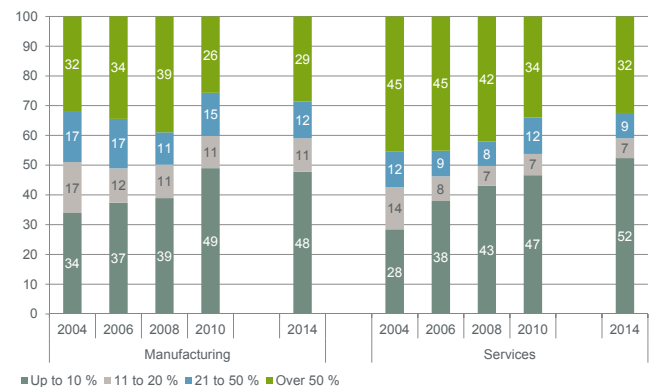


Note: A product is deemed a new product when the respective enterprise introduced it into the market within the past five years. Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

In comparison with the manufacturing sector, in the service sector the share of enterprises where new products account for more than 50 % of turnover tends to be higher. This is likely to be due to the different sizes of enterprises. Because small enterprises have a smaller product range, innovations they successfully bring to the market have a stronger impact on the turnover share than those of large enterprises.

**Figure 8: Turnover shares of new products by sector**



Note: A product is deemed a new product when the respective enterprise introduced it into the market within the past five years. Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

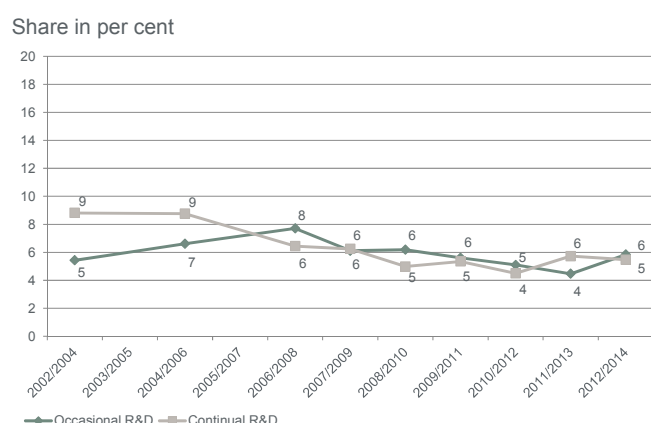
### Sources of innovation: SMEs conduct relatively little research and development of their own

The general rule is that the smaller an enterprise is, the more rarely it introduces innovations. Small enterprises have fewer resources and serve a narrower market segment. These disadvantages are exacerbated by the fact that innovation projects often cannot be split up at will. Minimum project sizes and high fixed costs mean

that innovations place a higher financial strain on small enterprises than on large ones.<sup>10</sup>

These size disadvantages also affect research and development projects. Because of their limited financial resources, it is rare for SMEs to conduct their own research and development (R&D), i.e. systematic creative work aimed at expanding existing knowledge and using it with the objective of finding new possibilities of application.<sup>11</sup> During the period from 2012 to 2014, only 5 % of enterprises conducted their own R&D continuously. Another 6 % conducted occasional research (Figure 9). That represents roughly one third of innovative SMEs. It also means that two thirds of innovative SMEs conduct no R&D work of their own.

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



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

Companies that conduct R&D bring forth innovations more frequently and usually pursue more ambitious innovation strategies.<sup>12</sup> The decline in SMEs undertaking their own R&D must therefore be viewed critically. Up to 8 % (2006/08) of SMEs conducted R&D occasionally and a further 9 % (2002/2004 to 2004/2006) of SMEs performed R&D continuously in the past decade. All company size classes show declining R&D activity. However, it was small enterprises in particular that discontinued their own R&D activities.

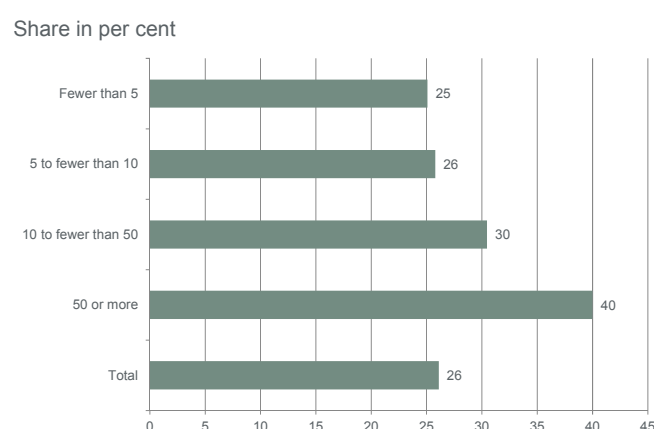
Currently, enterprises that conduct R&D regularly are found primarily among large SMEs with 50 and more employees and among R&D-intensive manufacturers, where the ratios are 26 and 20 %, respectively.

### Innovation partnerships are important

Amid limited resources, innovation partnerships are an attractive pathway for SMEs to expand their own innovation activity. An innovation partnership is defined as

the contractually arranged or informal cooperation of enterprises and institutions with the aim of realising innovation projects. It enables them to combine external expertise with internal skills. This arrangement allows companies to save resources, reduce risks to their success and realise potential synergies.<sup>13</sup> Economic policy debate often highlights the important role of transferring external knowledge into small and medium-sized enterprises. It regards collaboration with external partners as a key pathway and – given the growing complexity of innovation processes – increasingly important for innovative output.

**Figure 10: Enterprises with innovation partnerships by size**



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

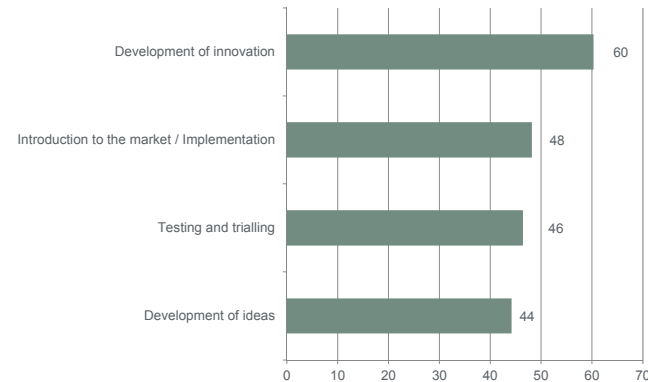
Overall, a good one fourth of innovative SMEs maintain innovation partnerships (Figure 10). As enterprises increase in size, that proportion rises from 25 % in enterprises with fewer than five employees to 40 % in large SMEs with 50 and more employees. Cooperation is most widespread in innovation projects of R&D-intensive manufacturers (46 %) and knowledge-based service providers (30 %). This is probably a reflection of the intensive innovative effort and comparatively high complexity of the innovation activity undertaken in these segments. Thus, 49 % of SMEs that conduct R&D on a continuous basis maintain a partnership. This proportion is only 18 % in enterprises that conduct no R&D of their own. By comparison, the variation in the use of innovative partnerships between enterprises that generate process innovations, product imitations or new-to-market innovations is insignificant.

Cooperation takes place at all levels of the innovation process (Figure 11). Development of innovations was mentioned as the main activity in 60 % of the responses. The joint development of ideas, the testing and trialing of an innovation, the introduction of an innovation to the market and/or its implementation in business op-

erations were mentioned by 44 to 48 % of respondents.

**Figure 11: Innovation partnerships by stage in the innovation process**

Share in per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

### Customers – the most important cooperation partners

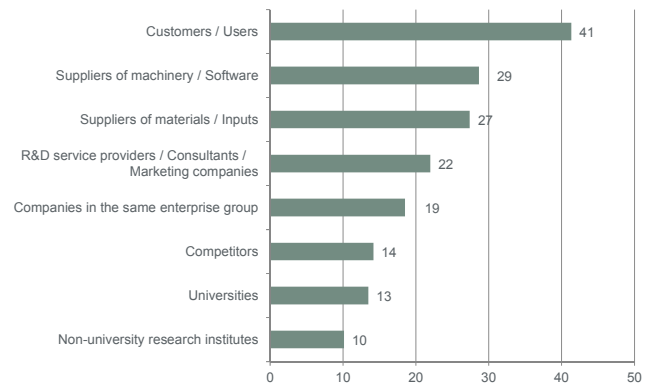
Customers are the preferred innovation partners, as stated by 41 % of the respondents (Figure 12). Customers are the most important cooperation partners especially for small enterprises, with 45 %. This is probably because small enterprises in particular align their innovation efforts closely with customers' desires.<sup>14</sup> Suppliers of machinery and software and suppliers of materials and inputs also play a key role, with values of 29 and 27 %, respectively.

By comparison, partnerships with competitors and with research institutes play a lesser role across the SME sector, with values between 14 and 10 %. However, universities and non-university research institutes are among the main cooperation partners of large SMEs and R&D-intensive manufacturers, as stated by up to 46 % of the respondents.

The reason that research plays a weaker role across the SME sector is probably that knowledge transfer is not profitable unless the SME in question is capable of absorbing and processing this knowledge further internally. Many SMEs, however, probably lack the ability above all to connect new research findings to their own knowledge base.<sup>15</sup>

**Figure 12: Innovation partnerships by cooperation partners**

Share in per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

### Enterprises with no partners see no need

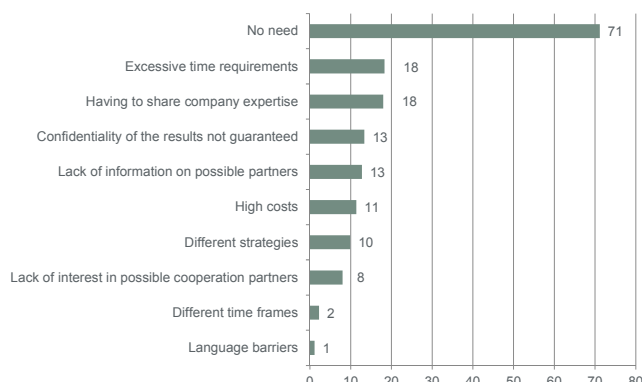
The vast majority of innovative enterprises without partnerships do not seek to cooperate at all. Seventy-one per cent of non-cooperating enterprises responded seeing no need for cooperation (Figure 13). Thus, comparatively few enterprises see obstacles to initiating or implementing innovations. The obstacles to cooperation most frequently reported by SMEs are, at 18 % each, excessive time requirements and having to share company expertise. Lack of interest in what the respondents considered attractive and potential cooperation partners was mentioned by 8 % of SMEs. Different time frames or even insurmountable language barriers were practically of no relevance, at 2 and 1 % of responses, respectively.

Small businesses mention cooperation obstacles slightly more frequently than large SMEs. At 69 %, however, the vast majority of non-cooperating enterprises with fewer than five employees also have no need for an innovation partnership. Obstacles to innovation therefore play a lesser role for the absence of innovation partnerships in this group as well. Accordingly, individual obstacles were mentioned by no more than around one fifth of SMEs in any size class or group of industries as a reason for not engaging in partnerships. This suggests that the untapped potential for implementing innovation partnerships is limited – at least from the perspective of the innovation-active small and medium-sized enterprises.



**Figure 13: Reasons for not engaging in innovation partnerships**

Share in per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

**External stimuli are important for innovation**

Partnerships are not the only external stimulus for innovative output. Many innovative SMEs also incorporate suggestions they receive on their own innovation projects from outside. In the 2013 survey, a total of 80 % of innovative SMEs reported having taken the corresponding ideas on board from external sources as well. These are mainly enterprises that produce product imitations, with 87 %. External stimuli play a lesser role for process innovators (79 %) and SMEs with new-to-market innovations (71 %).

At 39 %, customers are the most frequently used source of innovation ideas (Figure 14). That reflects SMEs' strong efforts to align their innovative activity with their customers' demands. Other sources are the trade press and the Internet, other enterprises such as suppliers and competitors and trade fairs, with values ranging from 27 to 22 %. A remarkable aspect is that Internet research ranks almost equally with the trade press. The remaining sources of ideas followed by a wide margin, with legislation mentioned most frequently by 11 %.

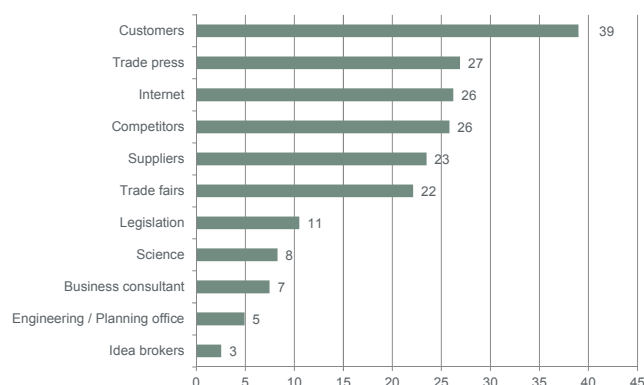
**Financing difficulties are the number one obstacle to innovation**

Small and medium-sized enterprises in Germany innovate more often than their European counterparts.<sup>16</sup> Nevertheless, German SMEs face a number of obstacles in harnessing their innovative potential.

Apart from the inhibiting factors of costs and risks – which are intrinsic to innovation projects and therefore typical characteristics of innovation – the lack of financing sources remains the most frequently mentioned obstacle to innovation (Figure 15).<sup>17</sup> The lack of suitable

**Figure 14: External sources of innovation ideas**

Share in per cent



Note: Figures extrapolated to the number of enterprises.

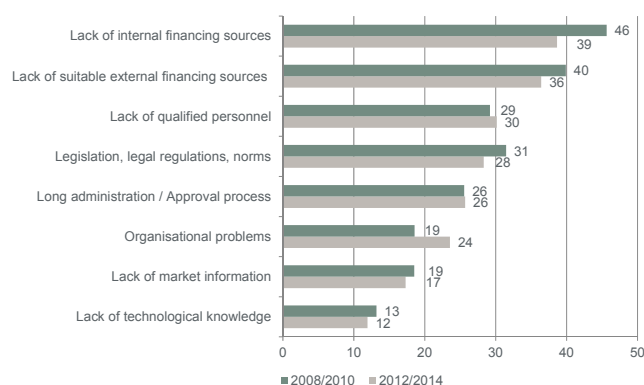
Source: KfW SME Panel 2013, own calculations

internal and external financing sources is mentioned by 39 and 36 %, respectively, of innovative SMEs and SMEs that are entirely prevented from innovating. Obstacles to innovation only rarely prevent innovative output completely. In most cases SMEs refrain from initiating specific projects or extend project timeframes.

Thus, despite the enterprises' significantly improved equity situation and the very favourable financing environment, the structural problems of innovation finance in the SME sector remain. A comparison with the survey period of 2008/2010 confirms this (Figure 15).

**Figure 15: Obstacles to innovation**

Share in per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

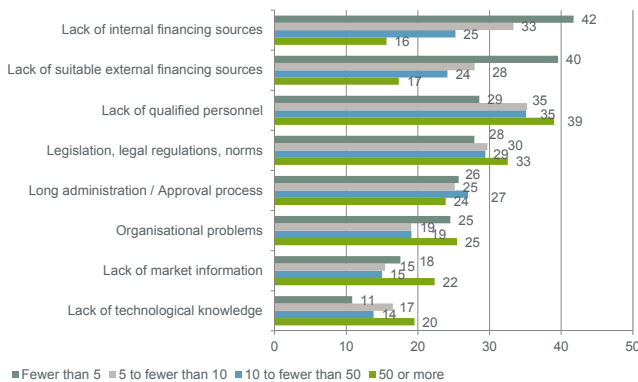
SMEs continue to face difficulties obtaining external finance because potential external providers of funding in particular find it difficult to assess the opportunities and risks associated with innovations. At the same time, innovation projects tend to involve more investment in expertise and less in physical assets, thus

generating comparatively few assets that could be used as collateral for debt capital. Another obstacle to external financing is that innovations by SMEs tend to involve rather low funding volumes.<sup>18</sup> This prevents companies from obtaining the required volume of external funds to supplement their limited internal funding capacity. External and internal financing obstacles therefore tend to arise together<sup>19</sup>.

Financing obstacles primarily affect small businesses, at 42 and 40 % (Figure 16). The difference between large SMEs and small businesses in the frequency with which they are mentioned is greater than for any other innovation obstacle. This is probably due not only to the higher burden posed by the share of fixed costs but also to a number of other factors. Small businesses per se represent a higher risk for providers of external capital and usually request the smallest sums. In addition, it is often argued that small businesses are less transparent for providers of external capital because they are subject to lower disclosure requirements, which makes their creditworthiness more difficult to assess.<sup>20</sup>

**Figure 16: Obstacles to innovation by company size**

Share in per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

### Financing is a problem especially for new-to-market innovations

The type of innovation (new-to-market, imitation, process innovation) also plays an important role for the significance of obstacles. Enterprises with ambitious innovation projects – such as the development of new-to-market innovations – are affected significantly more often by financing obstacles than other enterprises (Figure 17). This is presumably because the success probability of these kinds of projects in particular is especially difficult for external providers of capital to assess.<sup>21</sup>

### Lack of skilled personnel is second most important innovation obstacle

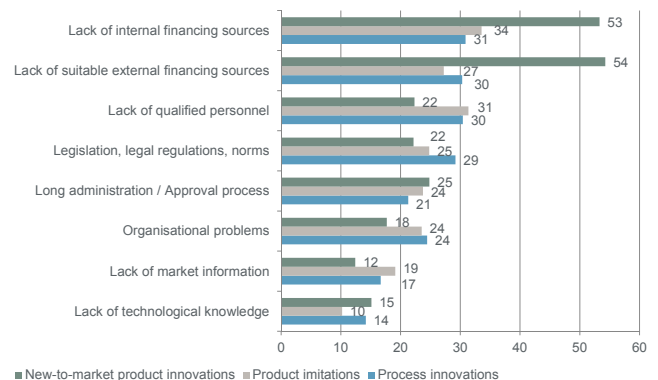
Skill shortages are the second most important bottleneck limiting SMEs' innovation activity after financing difficulties, with 30 % of responses. The frequent mention of lack of skilled personnel is explained by the fact that innovation-relevant knowledge in the SME sector is often concentrated on individual holders of expertise and their experience. Besides, many SMEs focus on their niche markets and align their innovations with individual customer preferences, which in many cases presumably requires very specific knowledge to be able to implement innovation activities.

SMEs with ambitious innovation projects, on the other hand, have fewer problems with skills shortages. This is probably due to the fact that having appropriately skilled personnel is a prerequisite precisely for the successful development of complex innovations.

Regulatory and administrative obstacles is ranked third. Legislation, legal provisions and norms were mentioned as innovation obstacles by 28 % of SME respondents. Administrative and licensing procedures were mentioned almost as often, by 26 %. What is remarkable here is that time-consuming administrative and licensing procedures were mentioned as obstacles primarily by small businesses and less often by SMEs with particularly ambitious innovation projects. This may indicate that the complexity of formal bureaucratic procedures is often underestimated, particularly by enterprises for which implementing innovations is not a routine activity.

**Figure 17: Obstacles to innovation by type of innovation**

Share in per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

### Organisation and skills-related obstacles mainly affect less innovative enterprises

Organisational problems (24 %), lack of market information (17 %) and of technological expertise (12 %) are mentioned less often than organisation and skills-related obstacles. That does not mean, however, that these aspects are not of considerable relevance for individual subareas of the SME sector. Organisational problems and lack of market information in particular are common in enterprises that engage in less ambitious innovation projects such as product imitations. More in-depth analyses show that these are often enterprises whose innovation and learning processes are little formalised.<sup>22</sup> It is particularly in this segment that innovation activity has decreased in the past years.

### Conclusion

After innovation activity in the small and medium-sized enterprise sector declined significantly in the past years, the share of innovators recently increased again slightly to 29 %. This is mainly due to the trend in product imitations. The share of SMEs with product imitations increased by two percentage points on the previous period to 17 %. This is probably due to the incipient economic recovery, which is primarily supported by domestic demand.

Particularly small enterprises and knowledge-based service providers recently increased their innovation output. Larger SMEs, manufacturers and enterprises with international operations, on the other hand, brought forth fewer innovations than before. The positive economic outlook gives hope that the current general trend to more innovation will continue into the year ahead.

Nevertheless, the present moderate increase in innovation should not hide the fact that the proportion of innovators is a good one third lower than the peak level it reached in the middle of the past decade. Among other reasons, this is probably due to greater price competition and an increase in workforce age.

The long-term decline in innovation activity is reflected in the up-to-dateness of SMEs' product range. The share of SMEs that achieve only 10 % or less of their turnover with new products or services has risen from 30 to 53 % since 2004. At the same time, the proportion of SMEs in which new products (or services) accounted for more than 50 % of turnover decreased to 31 %.

In generating innovations, SMEs do not rely exclusively on their own capabilities. Rather, a number of innovators also incorporate external stimuli. A good one fourth of enterprises partner with other enterprises or re-

search institutes to develop innovations. Four out of five enterprises make use of external sources to explore ideas.

In order for the moderate recovery in innovation to solidify into a trend reversal, the economy will have to continue to gather significant momentum particularly in the next quarters. All measures that contribute to overall stabilisation and growth in the euro area economy will thus also help to expand innovation activity.

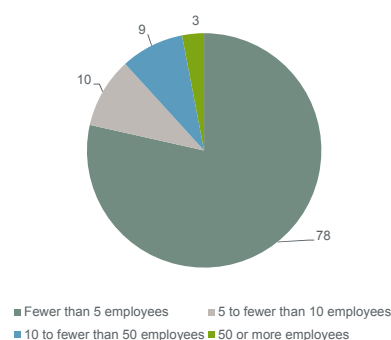
The survey also revealed that SMEs face a number of innovation obstacles. In order to encourage SMEs to undertake enhanced innovation efforts, economic policy should address the following specific innovation obstacles:

- Financing difficulties continue to be the main obstacle to innovation in the SME sector. Financing difficulties hold back small enterprises and companies with ambitious innovation objectives in particular. Enterprises' internal financing capacity should continue to improve on the basis of the positive economic outlook. However, the unfavourable economic situation of the past years is not the only cause of their financing problems. Their primary cause is market failure in the financing of innovations. This market failure is being addressed directly with measures for innovation finance that contribute to mitigating financing difficulties.
- The lack of skilled staff ranks second as an innovation obstacle behind financing restrictions. This is likely because innovation-relevant expertise in SMEs is often in the hands of only a few knowledge-holders within the enterprise. Another reason is that specialisation in niche markets and customer demands often require additional qualifications. The demographic development in Germany will presumably exacerbate these problems in the years ahead. In order to retain and, if possible, increase its innovative capability, the country will urgently require measures aimed at mobilising, training and developing the capacities of its workforce.
- Regulatory and administrative hurdles also constitute innovation obstacles for many SMEs. Many administrative procedures and legal norms that may hamper innovation are not intended to regulate innovation, however, but serve other purposes. Conflicting goals therefore exist that have to be balanced. Nevertheless, it may be useful to review legal norms and administrative procedures for their necessity in order to help promote more innovation.
- Importantly, organisation- and skills-related obstacles hamper SMEs' innovation activity. In the survey

they generally mentioned these hurdles less frequently than the obstacles described above. However, they were most common in SME segments in which innovation activity has seen the strongest decline in the past years. Solving internal problems in the area of innovation management is, first and foremost, a challenge the enterprises themselves need to take on. Studies have shown that SMEs are able to compensate the lack of own R&D to a certain degree by structuring their informal learning and innovation processes more systematically.<sup>23</sup> Putting in place an adequate, employee-oriented innovation management system should therefore be an important approach to removing skills-related innovation obstacles. Economic policy can provide SMEs with valuable support here as well. ■

**Figure 18: Innovative SMEs by company size**

Share in per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

**The structure of innovative SMEs in 2012/2014**

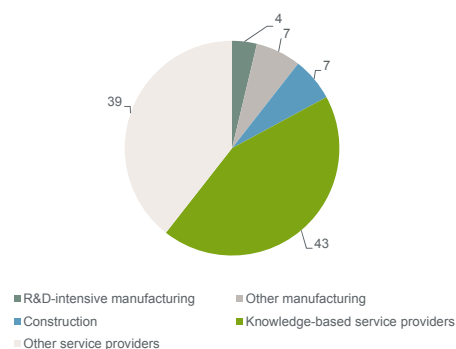
The SME sector covers all enterprises in Germany whose annual turnover does not exceed EUR 500 million. According to this definition, around 3.67 million SMEs exist in Germany. The SME sector thus accounts for 99.95 % of all enterprises in Germany. Of these, 1.05 million are innovators.

The majority of innovative SMEs are small enterprises. Most innovative SMEs (819,000 enterprises, or 78 %) 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 11 % of innovators while the services sector represents 82 %.

Sixty-five per cent of innovative SMEs do not conduct any R&D of their own. Only 17 % perform research continuously while 18 % undertook some R&D activities occasionally in the past three years.

**Figure 19: Innovative SMEs by industry**

Share in per cent

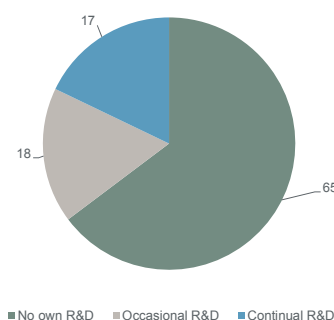


Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

**Figure 20: Innovative SMEs by own R&D activity**

Share in per cent



Note: Figures extrapolated to the number of enterprises.

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 12,207 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 parent 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 2015 survey used the German Company Register (Unternehmensregister) and the official employment statistics (Erwerbstätigenrechnung) to determine the population of SMEs in 2014 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 class 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 13th wave of the KfW SME Panel was conducted in the period from 23 February 2015 to 26 June 2015.

<sup>1</sup> Cf. Borger, K., Lüdemann, E., Zeuner, J. and V. Zimmermann (2013): Deutschlands Wachstum in der Demografiefalle: Wo ist der Ausgang? (*Germany's growth in demographic trap: Where is the way out?*) KfW Economic Research. Papers and Proceedings, November 2013 (in German).

<sup>2</sup> Cf. for example Zimmermann, V. (2015): KfW Innovation Report SMEs 2014. Standstill in Europe is slowing down innovation. KfW Special Publication, or Zimmermann, V. (2013): Innovation und Beschäftigung. Die Beschäftigungswirkung verschiedener Arten von Innovationen in expandierenden und schrumpfenden mittelständischen Unternehmen (*Innovation and employment. The employment effect of different types of innovation in expanding and contracting SMEs*), Journal of Business Economics, ZfB-Special Issue 4/2013 (in German): p. 131–149.

<sup>3</sup> 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.

<sup>4</sup> Cf. Poschen, K. and V. Zimmermann (2014): Falling sales expectations curb SME innovation activity in Germany. KfW Research, Economics in Brief No. 58, 13 October 2014, and for more detailed information: Zimmermann, V. (2010): Innovation und Konjunktur (*Innovation and economic activity*). KfW Economic Research. Points of View No. 10, June 2010 (in German).

<sup>5</sup> A new-to-market product or service is one that is new not just to the enterprise but also to the relevant market. This does not necessarily mean, however that it is being offered for the first time in the world.

<sup>6</sup> Cf. Mansfield, E. (1981): Imitation costs and patents: an empirical study, *Economic Journal* 91: 907–918.

<sup>7</sup> Cf. Peters, B. et al. (2014): Firm Growth, Innovation and the Business Cycle. Background Report for the 2014 Competitiveness Report.

<sup>8</sup> 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.

<sup>9</sup> Zimmermann, V. (2015), KfW SME Innovation Report 2014: Standstill in Europe is slowing down innovation. KfW Special Publication.

<sup>10</sup> Cf. Zimmermann, V. (2014): KfW SME Panel 2013: Innovations. 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.

<sup>11</sup> Cf. OECD (2015): Frascati Manual 2015. Guidelines for collecting and reporting data on research and experimental development.

<sup>12</sup> Cf. Zimmermann, V. (2012): Barriers to innovation in SMEs. KfW Economic Research. Focus on Economics No. 6, 6 September 2012.

<sup>13</sup> Cf. in more detail Zimmermann, V. (2003): Kooperationen bei Innovationsvorhaben kleiner und mittlerer Unternehmen: Einbindung externen Wissens und Verteilung von Risiken und finanziellen Lasten (*Partnerships in innovation projects of small and medium-sized enterprises: embedding external knowledge and distributing risks and financial burdens*), in: Fitzenberger, B.; Smolny, W. and P. Winker (publisher.): Herausforderungen an den Wirtschaftsstandort Deutschland (*Challenges for Germany as a business location*), 109–122, Nomos, Baden-Baden (in German).

<sup>14</sup> Cf. Zimmermann, V. (2012): To be the Leader of the Pack? Innovation strategies in the German SME sector. KfW Economic Research. Focus on Economics No. 11, November 2012.

<sup>15</sup> Cf. Cohen W. and D.A. Levinthal (1989): Innovation and Learning: The two sides of R&D. *Economic Journal* 99: 569–596.

<sup>16</sup> Cf. European Commission (2015): Union Innovation Scoreboard 2015.

<sup>17</sup> The intensity of innovation obstacles is rated on a five-point scale where 1 = "very significant" to 5 = "insignificant". An obstacle is then categorised in the survey as significant when an enterprise has rated it 1 or 2.

<sup>18</sup> Cf. in more detail Zimmermann, V. (2015) Innovationsfinanzierung. Herausforderung für mittelständische Unternehmen (*Innovation finance. Challenge for small and medium-sized enterprises*), *Corporate Finance* 6/2015: 183–190 (in German).

<sup>19</sup> Cf. Arend J. and V. Zimmermann (2009): Innovationshemmnisse bei kleinen und mittleren Unternehmen (*Innovation obstacles to small and medium-size enterprises*). KfW Research, Mittelstands- und Strukturpolitik No. 43, 57–95 (in German).

<sup>20</sup> Cf. Cosh, A. and A. Hughes (1994): Size, financial structure and profitability: UK companies in the 1980s. In: Hughes, A. and D. Storey (Hrsg.): *Finance and the small firm*, 18–63, or Berger, A. N. and G.F. Udell, (1998): The Economics of Small Business Finance, *Journal of Business Finance and Accounting* 28: 671–692.

<sup>21</sup> In addition, in many cases innovation results can be protected only inadequately from use by third parties. Competitors often find ways to exploit the knowledge generated at low cost to develop ideas of their own or to imitate the innovation (knowledge spillover). The consequence is that income is divided between the original innovator and its imitator while the original innovator has to bear the bulk of the costs. The spillover thus generates an unfavourable cost-benefit ratio for the original innovator so that the cost of innovation may appear excessively high for the enterprise, which then opts to abandon the innovation. For SME protection strategies, cf. Zimmermann and Thomä (2012): Innovationsschutz im Mittelstand: Strategien und deren Bestimmungsfaktoren (*Protecting innovations in SMEs: Strategies and their determinants*), KfW Economic Research. Points of View No. 16, March 2012 (in German).

<sup>22</sup> Cf. Thomä, J. and V. Zimmermann (2016): Innovationshemmnisse in KMU. Eine empirische Analyse unter Berücksichtigung des Handwerks (*Barriers to innovation in SMEs. An empirical analysis taking into account the skilled crafts*). Göttinger Beiträge zur Handwerksforschung No. 6 (in German).

<sup>23</sup> Cf. e. g. Rammer, C., Czarnitzki, D. and A. Spielkamp (2009): Innovation success of non-R&D performers: substituting technology by management in SMEs. *Small Business Economics* 33/1: 35–48.