

# Focus on Economics

No. 6, 6<sup>th</sup> September, 2012

## Barriers to innovation in SMEs

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This analysis based on the KfW SME panel shows that financing difficulties are the number one obstacle to innovation for SMEs. 43 (or 37 %) of the SMEs active in innovation indicate that they are limited by a lack of internal and appropriate external funding sources. Financing difficulties occur more often the smaller a company is and the greater its innovation efforts. Financing barriers mean that significant potential opportunities are left to lie fallow, which is due to market imperfections. Therefore, support of innovation represents a long-term economic policy task. In addition to bureaucratic obstacles to innovation, the availability of qualified employees for innovation tasks – especially for larger SMEs – is a very common obstacle. Against the background of demographic trends, this critical factor for securing the future competitiveness of SMEs will gain in significance.

New and improved products and production processes accelerate structural change and increase competitiveness in domestic and global markets. Innovative companies and sectors therefore develop more dynamically than others.<sup>1</sup> It is undisputed that innovations and technological progress are the main drivers of long-term economic growth and make a significant contribution to ensuring prosperity in Germany. Even in overcoming the challenges of climate change, scarcity of resources, the acceleration of globalization and demographic development, an ongoing generation of new and more efficient technologies is necessary.

SMEs constitute a significant part of the innovation system in Germany. Small- and medium-sized enterprises (SMEs) provide a good quarter of the innovation expendi-

tures of the business sector in Germany, and more frequently develop innovations in international comparison than their European counterparts.<sup>2</sup> However, subsequent to the recent economic and financial crisis of 2008/09, the proportion of SMEs that produce innovations has significantly decreased and it has not yet recovered to the level it was at in the middle of the past decade. The continuous decline in development of market novelties for nearly the past decade, in particular, has also resulted in a cause for concern.<sup>3</sup>

### Barriers to innovation at SMEs

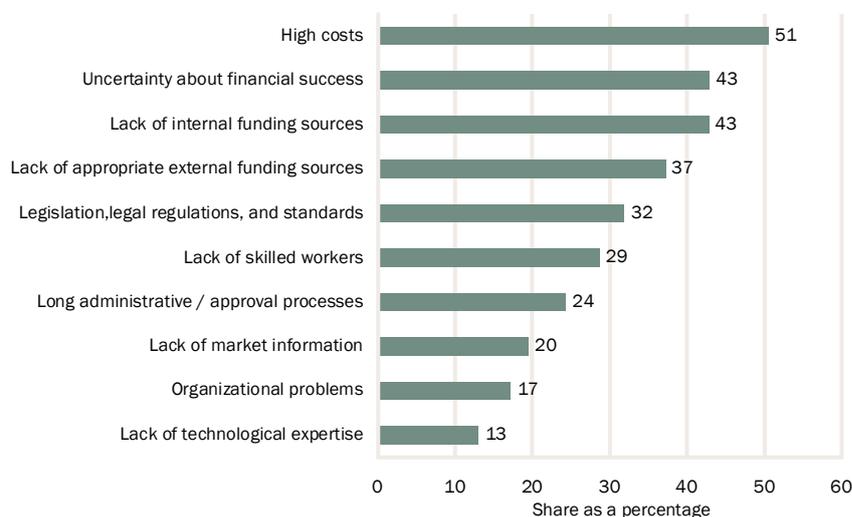
Given this, based on the KfW SME panel, we will investigate below which factors hinder the successful implementation of innovations in innovatively active SMEs (up to 500 million Euros in annual sales).<sup>4</sup>

As shown in Figure 1, innovative SMEs indicate that high costs (51 %) and uncertainty about financial success (43 %) are

the most frequent obstacles to their innovation activities.<sup>5</sup> In the assessment of these aspects, however, one must keep in mind that these obstacles are inherent to innovation activities and are typical features of an innovation project. Consideration of cost and risk criteria is the basis of entrepreneurial activity and so neither of these factors strictly speaking constitutes a barrier to innovation. Therefore, both of these aspects are excluded from the following analysis.

By contrast, the lack of funding is an obstacle that points to financial restrictions, which may be the expression of a market failure in the financing of innovation,<sup>6</sup> since it is significantly more difficult for external investors than it is for innovating companies to assess the opportunities and risks of a project. This is especially true for technologically challenging projects, as well as for the development of market novelties, in which both the technical feasibility and the market success are particularly difficult to estimate. The unequal distribution of information ("information asymmetry") causes that external investors are less willing to finance such projects.<sup>7</sup> As a result, companies cannot supplement their limited internal financial resources to the extent necessary through external means,

Figure 1: Factors hampering innovation in the SME sector in 2008–2010



Note: only companies with innovation activities

Source: KfW SME Panel 2011

so that external and internal financing constraints usually occur together.<sup>8</sup> The lack of internal and appropriate external sources of funding is mentioned by 43 (or 37 %) of the innovating SMEs.

Barriers resulting from regulations and administrative procedures also play a role for SMEs: For instance, the percentage of SMEs active in innovation that report "legislation, legal regulations, and standards" as impediments to innovation is 32 %. And 24 % see their innovation activities affected by long administrative and approval procedures.

In addition to financial resources, human resources can also be a limiting factor for the innovation activities of a company. What seems particularly relevant for the innovation activities of companies is the availability of skilled workers, which has recently become a focus of public perception. As seen in Figure 1, a shortage of skilled employees constitutes an obstacle for 29 % of SMEs.

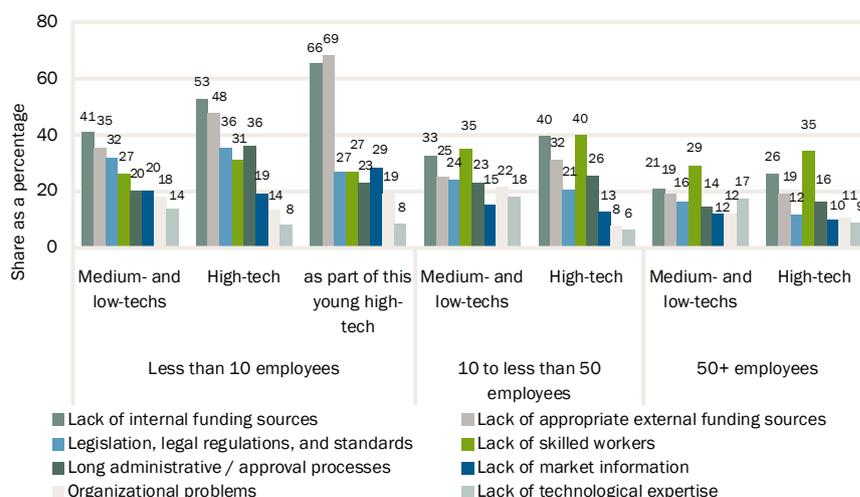
Thus, only company-external barriers are ranked in the top positions, while on the other hand, internal barriers to innovation are of lesser significance: of the internal barriers, lack of market information (with just over 20 %), followed closely by organizational issues (17 %), play the most important role. Finally, 13 % of the innovative SMEs mention lack of technological expertise as a barrier to innovation.

### Distribution of barriers to innovation in SME groups

To investigate the effect of barriers to innovation more closely, the SMEs that are innovatively active are divided into various categories hereinafter according to size, the intensity of R&D activities, and the age of the company. Following the usual definition for industrial branches, companies with an R&D intensity of over 7 % – measured as R&D expenses with respect to annual sales – are designated as high-tech companies.

Emerging technology companies play a special role in the innovation system, since it is precisely the high-tech startups that are often the first to use new technological knowledge generated outside of the corporate sector and to use them to develop marketable products. They are therefore an important transfer channel for the

Figure 2: Barriers to innovation per SME groups 2008–2010



Note: only companies with innovation activities

Source: KfW SME Panel 2011

commercialization of radical technological advances. In the following, therefore, the small group of young – i. e. no more than 10 years old – high-tech companies will be considered separately.<sup>9</sup>

Figure 2 shows the distribution of the barriers to innovation in the SME groups examined here. The lack of funding is one of the most significant barriers to innovation in all the groups studied, with high-tech startups being affected far more often by funding constraints than other SMEs. At 66 % and 69 %, funding difficulties are significantly greater at these companies than the other innovation barriers: Funding barriers are mentioned more than twice as often as the lack of market information, which is in third place. Small SMEs with high R&D intensity are generally strongly affected by financing constraints. 53 (or 48 %) of the high-tech companies with fewer than 10 employees reported a lack of internal or external sources of financing, such that financing constraints also constitute – by far – the most significant barriers to innovation for these companies.

In both company groups, this seems to be due to comparatively high financing requirements accompanied by low internal resources and to the fact that the strong focus on technology makes it difficult for potential investors to gauge the chance of success. Especially for emerging technology companies, these features occur in an exaggerated form: financing needs, technology orientation, and degree of novelty of the innovations are particularly pro-

nounced. Furthermore, their brief company histories make the assessment of risks that much more difficult for external investors.

In Figure 2, it can be seen that companies with high R&D intensity are more frequently affected by problems financing their innovation activities than other companies. However, financing constraints decrease with increasing company size. This reflects the fixed cost nature of innovation activities as a result of their indivisibility, which leads, particularly in small companies, to disproportionately high financial costs. For example, the proportion of companies with 50 or more employees and high R&D intensity that say a lack of internal or external financing is a barrier to innovation is 19 (or 26 %) and 19 and 21 % for their counterparts with fewer R&D activities, which is significantly lower than in the respective control group with fewer employees.

It is also striking that – at least relatively – the significance of insufficient human resources increases as a barrier to innovation with increasing company size. Thus, the lack of skilled workers ranks among the companies with 10 to less than 50 employees at par with the lack of internal funding. For the even larger SMEs (50+ employees), the lack of skilled workers – at 35 % in the high-tech companies and 29 % in companies with fewer R&D efforts – represents a significantly more widespread barrier to innovation than financing restrictions.

Unlike what has been determined here, small SMEs typically have more problems filling skilled worker positions.<sup>10</sup> This, and the fact that companies with high R&D activity list a lack of skilled labor as a barrier to innovation, suggests that this finding does not show a general shortage of skilled labor but rather specific bottlenecks in the availability of employees responsible for innovation tasks. It is precisely SME innovators that often focus on niche markets and the creation of customized client solutions, which are often based on expertise from their manufacturing experience and long-term client relationships, which may complicate the recruitment of employees with the corresponding skills. This is also confirmed in that especially the SMEs with high R&D efforts specify "required specific supplementary qualifications" as the cause of their staffing problems.<sup>11</sup>

With regard to the bureaucracy-related barriers, it can be determined that "legislation, legal regulations, and standards" especially impact small companies, and are cited increasingly rarely with increasing company size. In addition, it can be seen that, above a company size of more than 10 employees, these obstacles are mentioned more frequently by the SME / low-tech companies. Long administrative and permit procedures are also less often identified as obstacles to innovation with increasing company size. Companies with high R&D activity – with qualifications for high-tech start-ups – are more frequently affected, which was not the case with regard to legal

regulations and standards. This seems to be due to the fact that permits for the development and introduction of original innovations – as is typically the case with companies with high R&D activity – are required more often than for a product imitation or for the acquisition of a new procedure which has, however, already been proven elsewhere.

Finally, the internal barriers to innovation, such as the lack of market information, organizational problems, and lack of technological expertise, are found more frequently at low-tech than at companies with strong R&D activities. The reason for this seems to be that the intense innovation efforts in the latter companies have resulted in the buildup of expertise and experience during the implementation of innovation projects.

High-tech start-ups are here an exception. As compared to the other SME groups with more intensive R&D, they more frequently cite a lack of market information and organizational issues, which seems to be due to their brief existence on the market. Precisely with regard to market information, it must also be kept in mind that young technology companies often operate in new markets, in which customer preferences are not yet well known and the preferred design has yet to emerge.<sup>12</sup>

### Conclusion

If one excludes high costs and economic risks – typical features of innovation pro-

jects, since, strictly speaking, they do not constitute a barrier of innovation – the following key findings emerge in regard to economic policy implications:

Lack of funding is still the number one obstacle to innovation for SMEs. Thereby, the financing of innovation poses considerably more difficulty for small companies than it does for larger companies. Furthermore, financing difficulties occur more frequently as the innovation efforts of a company increase. Therefore, it is exactly those companies that are most important for the structural change and competitiveness of the German economy that are the most affected by financing barriers. Since financing difficulties mean that important potential innovations are never pursued due to market imperfections, support of innovation represents a long-term economic policy task.

In addition to bureaucratic obstacles, recruitment and retention of qualified employees responsible for innovation activities is – especially for larger SMEs – also a widespread impediment to innovation. Given the demographic trends in Germany and the importance that SMEs attach to qualified employees as repositories of expertise,<sup>13</sup> SMEs will probably place more emphasis on this aspect in the future with a view to the long-term security of their competitiveness. Qualifying and training measures will therefore also increase in significance as part of innovation support. ■

<sup>1</sup> See Zimmermann, V. (2012): Führen Innovationen im Mittelstand zu mehr Beschäftigten? [*Do Innovations at SMEs Lead to More Employees?*], KfW-Research. Standpunkt No. 17, May 2012.

<sup>2</sup> See Rammer, C., Aschhoff, B., Crass, D., Doherr, T., Hud, M., Köhler, C., Peters, B., Schubert, T. and F. Schwiebacher (2012): Innovationsverhalten der deutschen Wirtschaft [*Innovation activities in the Germany economy 2011*]. Indikatorenbericht zur Innovationserhebung 2011 and Rammer, C. and B. Weissenfeld (2008): Innovationsverhalten der Unternehmen in Deutschland 2006. Aktuelle Entwicklungen und internationaler Vergleich [*Innovation activities of German companies 2006. Current developments and international comparison*]. Studien zum deutschen Innovationssystem. [*Analysis of the German innovation system*] No. 04-2008.

<sup>3</sup> See Zimmermann, V. (2011): Weniger Marktneuheiten im Mittelstand [*Fewer market novelties in SMEs*], KfW-Research, Akzente No. 54, December 2011.

<sup>4</sup> The KfW SME Panel 2011 is a representative company survey with responses from over 12,000 SMEs with annual sales each of up to 500 million Euros. In particular, companies with less than five employees were included, which according to calculations based on the KfW SME panel, constitute more than four-fifths of the SMEs in Germany, and are usually not included in comparable data collections. See Reize, F. (2011), KfW SME Panel 2011: Mittelstand gut gerüstet gegen zunehmende Finanzierungsrisiken und konjunkturelle Abschwächung [*SMEs well prepared for increasing funding risks and economic slowdown*].

<sup>5</sup> The respondents could rate the significance of the individual barriers for their company on a scale of 1 (= "very high significance") to 5 (= "no significance"). For the following ratings, a barrier was therefore indicated if a company responded with 1 or 2 in these response categories.

<sup>6</sup> See Hall, B. H. and J. Lerner (2010): The Financing of R&D and Innovation. In: Hall, B. H. and N. Rosenberg (Ed.) Handbook of the Economics of Innovation, Elsevier-North Holland.

<sup>7</sup> For more detail see Zimmermann (2010): Die Finanzierung von Innovationen in kleinen und mittleren Unternehmen [*The Financing of Innovations at SMEs*]. In: KfW, Creditreform, IfM, RWI, ZEW (Ed.), Konjunkturelle Stabilisierung im Mittelstand – aber viele Belastungsfaktoren bleiben [*Economic Stabilization at SMEs - But Many Stress Factors Remain*]. MittelstandsMonitor 2010 – Jährlicher Bericht zu Konjunktur- und Strukturfragen kleiner und mittlerer Unternehmen [*SME Monitor 2010 Annual Report on Cyclical and Structural Issues at SMEs*], Frankfurt am Main, pp. 145–171.

<sup>8</sup> See Arend J. and V. Zimmermann (2009): Innovationshemmnisse bei kleinen und mittleren Unternehmen [*Barriers to Innovation at SMEs*]. KfW-Research, Mittelstands- und Strukturpolitik No. 43, pp. 57–95.

<sup>9</sup> It should be noted in this context that companies in existence for less than three years are rarely represented in the KfW SME panel due to problems identifying them.

<sup>10</sup> See Reize (2011): Fachkräftemangel im Mittelstand: Generelles oder partielles Problem? [*Shortage of Skilled Workers at SMEs – a General or Partial Problem?*] Akzente No. 41, May 2011.

<sup>11</sup> See *ibid.*

<sup>12</sup> For more detail see Niefert H. and V. Zimmermann (2009): Die Dynamik im Innovationsverhalten kleiner und mittlerer Unternehmen [*The Dynamics of Innovation in the Behavior at SMEs*] In: KfW, Creditreform, IfM, RWI and ZEW (Ed.), Deutsche Wirtschaft in der Rezession – Talfahrt auch im Mittelstand [*German Economy in Recession – the SME Sector Also Declines*]. Mittelstandsmonitor 2009 – jährlicher Bericht zu Konjunktur- und Strukturfragen kleiner und mittlerer Unternehmen [*SME Monitor 2009 – Annual Report on Economic and Structural Issues at SMEs*]. Pp. 107–134.

<sup>13</sup> See Zimmermann V. and J. Thomä (2012): Innovationsschutz im Mittelstand: Strategien und deren Bestimmungsfaktoren [*Protection of Innovation at SMEs: Strategies and Their Determining Factors*], KfW-Research. Standpunkt No. 16, March 2012.