

# Focus on Economics

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## The innovation motor is sputtering Innovation activities in the German SME sector

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The innovation activities of small and medium-sized enterprises (SMEs) have not yet recovered since the turning point during the 2008/09 crisis. The sharply reduced share of enterprises with product imitations means that innovations in the SME sector are being spread more slowly than before. The share of SMEs which are developing market novelties has declined by almost half in the past decade – regardless of the economic developments. Discontinuing the development of new products combined with a cutback in R&D activity is leading to the loss of important technological know-how. This weakens the future ability of affected companies to innovate and Germany's technological capacity. In order to jump-start innovative activities across a broad basis it is necessary to overcome the uncertainties regarding the progress and the consequences of the Euro crisis.

Innovation and technical progress make a significant contribution to securing prosperity in a highly industrialised economy that is poor in raw materials such as Germany. They are the driving forces of structural change, they increase international competitiveness and last but not least are essential determinants of long-term economic growth. In the previous three decades – depending on the specific time frames and methodology applied – between one and nearly two thirds of economic growth is due to technical progress.<sup>1</sup>

### Germany has innovation potential

Germany's capacity for innovation is currently still among the highest in the world. For triade patents in terms of the number of inhabitants, Germany ranks fourth among OECD countries.<sup>2</sup> Germany has the

highest share of companies introducing new products or processes compared to all other European countries (see Table).

However, already in the 1990s Germany was no longer able to keep up with the rapid expansion of R&D activities in Japan, (South) Korea, Sweden or Finland. In comparison with OECD countries, Germany slipped from a leading position at the beginning of the 1980s to 9<sup>th</sup> place.<sup>3</sup> The increase of R&D expenditures (in terms of GDP) by 16.1 % since 2005 to 2.88 % (2011) is insufficient to make up the lost terrain.<sup>4</sup>

The German innovation system shows weaknesses particularly in the area of leading-edge technologies. The High Technology sector accounts for 27.7 % of the R&D expenditures in Germany, while the corresponding average OECD figure is 40.4 %. In contrast, 54.3 % of German R&D is focused on Medium-high Technology (OECD: 42.1 %).<sup>5</sup> However, Germany's

foreign trade advantages in its traditional area of competence have declined compared to the mid-1990s. In particular emerging markets have been able to catch up.<sup>6</sup>

### SMEs are an important component of the German innovation system

Small and medium-sized enterprises provide a good fourth of innovation expenditures in Germany's business sector and compared internationally develop innovations more frequently than their European counterparts.<sup>7</sup> The following conclusions can be drawn from the KfW SME Panel, which has been collecting data for ten years:<sup>8</sup>

### Still no recovery of innovative activity in SME sector following decline caused by the crisis

The share of innovators, i. e. companies that introduced at least one product or process innovation in the past three years,<sup>9</sup> increased to 43 % up to 2006.<sup>10</sup> On the heels of the economic and financial crisis in 2008/2009 the innovator rate dropped sharply by a third to 29 % (see Chart 1). Currently (2011) the share of innovators in the SME sector remains practically unchanged at 30 %. The improving economy following the recovery from

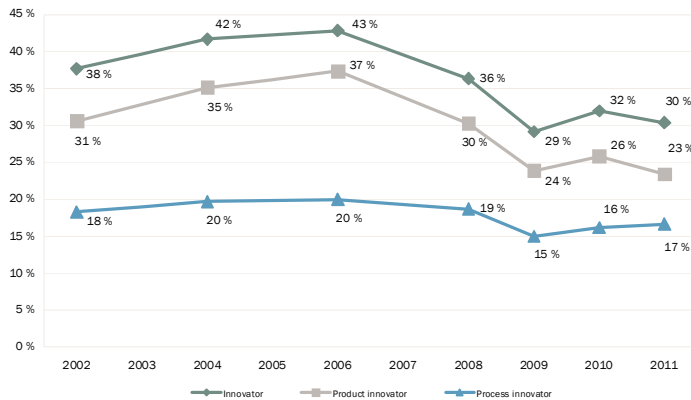
Table : Key figures of the innovation system in selected OECD countries

	Share of innovators 2010 in percent	R&D expenditures of GDP 2010 in percent	Triade patent applications 2009 per million inhabitants
Germany	50	2.88*	70.4
Finland	42	3.87	63.0
France	32	2.26	39.2
Italy	38	1.26	13.0
Japan	—	3.26	104.5
(South) Korea	—	3.74	40.2
Netherlands	45	1.85	56.0
Sweden	45	3.43	96.8
Switzerland	—	2.99**	113.5
Spain	26	1.39	4.9
USA	—	2.90***	44.7
United Kingdom	—	1.76	27.3
OECD	—	2.40***	37.3

Note: \* 2011, \*\* 2008; \*\*\* 2009; share of innovators: only companies with 10 employees or more

Source: EUROSTAT; Community Innovation Survey 2011; OECD; Stifterverband.

Chart 1: Development of key innovation figures in the SME sector



Note: Extrapolated with the number of companies

Source: KfW SME Panel.

the crisis in 2010 initially brought some growth, but this proved not to be sustainable.

**Product innovations dominate in the SME sector...**

Product innovators account for the largest group among innovating SMEs. Their share is between 23 and 37 % and thus 1.4 times (2011) to 1.9 times (2006) higher than the respective share of process innovators.

**...and determine the development of the innovator rate over time**

At the beginning of the observation period SMEs primarily used the increasing improvement of the economy to introduce more new products and services to the market. The share of product innovators climbed from 31 to 37 % in 2006 (+19%). In light of the looming financial and economic crisis they significantly cut back on the introduction of product innovations. The share of product innovators dropped from 35 % to 24 % up to 2009. Since then the share of product innovators has not recovered and, at 23 %, is currently (2011) even lower than two years ago.

**The economic cycle determines the timing of product innovations**

The sharp drop in product innovations following the 2008/2009 crisis is likely due to the fact that, particularly for new products and services, success depends greatly on correct placement within the demand cycle. As demand expands new products are able to establish themselves better on the market than when the econ-

omy is weakening. Innovating enterprises take this into account when introducing new products and services to the market.<sup>11</sup> Moreover, innovations are to a great extent financed through internal funding.<sup>12</sup> So companies' earning power, which was worsened by the financial and economic crisis<sup>13</sup> and the associated increased difficulties for financing innovations is likely to have contributed to the decline in innovative activities overall.

**Economic cycle has less influence on implementation of process innovations**

In contrast, process innovations react only to a small degree to the economic environment. This applies to the first half of the past decade during which the share of process innovators increased by only two percentage points to 20 % (2006) – as with the 2008/2009 crisis, during the course of which the process innovator rate declined by five percentage points, which

was less than for product innovators. In contrast to the share of product innovators, the number of SMEs introducing new processes increased since then moderately by two percentage points to 17 % (2011).

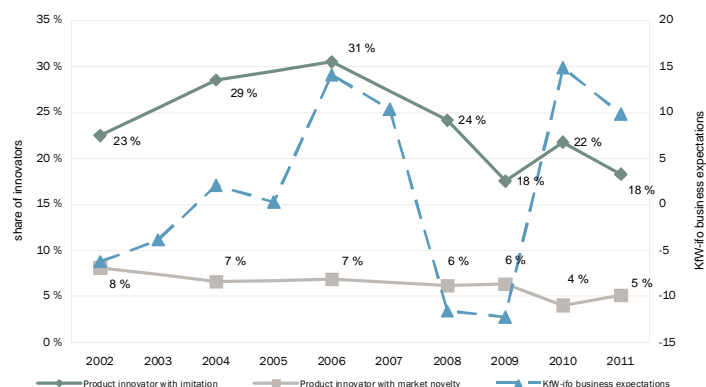
Although new processes are also frequently implemented in combination with new products, the reason for the limited influence of the economic trend on process innovations is the often increased pressure for cost-reducing process innovations during weak economic periods due to declining company profits.

**Product imitations strongly dependent on economic developments...**

Particularly the share of SMEs, that implemented product imitations – i. e. new or significantly improved products or services, introduced by a firm onto its market, which were already offered by competitors – varies strongly over a business cycle (see Chart 2). The comparison to the business expectations according to the KfW-ifo SME barometer reveals an increase in the implementation of product imitations in an environment of improving business expectations (up to 2006) and a reduction with the decline in business sentiment in 2008/2009. At 42 %, product imitations dropped particularly strong between 2006 and 2009.<sup>14</sup> The fluctuations in subsequent years also confirm that the implementation of product imitations is highly sensitive to economic developments.

Product imitations are rarely based on long-term development efforts and thus corresponding activities can be taken up on short notice and then stopped when

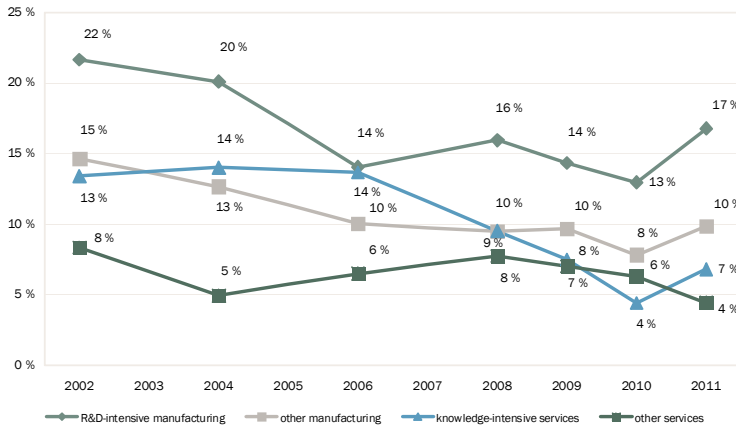
Chart 2: Development of the share of product innovators with market novelties and product imitations



Note: Extrapolated with the number of companies

Source: KfW SME panel.

**Chart 3: Development of the share of product innovators with market novelties according to economic sector**



Note: Extrapolated with the number of companies. Does not include companies with less than five employees.

Source: KfW SME panel.

needed. This makes it quite possible to market these innovations based on the patterns of demand.

**...and continuous decline in the development of market novelties**

In contrast, the development of market novelties - which occurs considerably less frequently than product imitations - usually requires greater innovative efforts and longer-term development phases. Correspondingly, in terms of the share of enterprises which introduce market novelties, there is no indication of a strong connection to the economic situation. Instead, the rate of original product innovators declined almost continuously over the entire observation period from 8 to 5%. Thus, the share of SMEs creating market novelties has dropped by almost half in the last decade. This can be interpreted as a clear sign that innovation strength in SMEs is generally declining. One encouraging aspect is that the negative trend at the end point seems to have been halted.

**Market novelties are increasingly concentrated in the manufacturing industry**

Compared to 2002, the share of enterprises developing (product) market novelties has declined in all economic sectors (see Chart 3).<sup>15</sup> In the manufacturing industry the flagging trend has stabilised since 2006.

In the R&D intensive sectors of the manufacturing industry there are even signs of a considerable increase. In contrast, in the

service sector - particularly in the knowledge-based industries - original product innovations are being developed increasingly less frequently.

**Declining R&D activities in knowledge-based services**

Particularly for the development of market novelties it is important for enterprises to have their own R&D.<sup>16</sup> It is thus not surprising that in terms of knowledge-based services, the share of enterprises engaged in R&D on a continuous basis was at 20% in 2002 and declined sharply to 12% in 2011. The corresponding figures for those engaged occasionally in R&D are 14 and 8% (see Chart 4).<sup>17</sup>

No clear trend in R&D activity can be detected for the manufacturing industry: After declining shares were discernable at the beginning of the observation period, at the

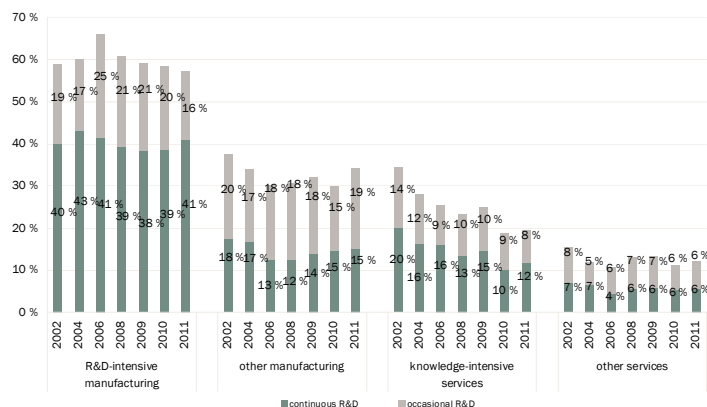
end point there are signs of an overall small increase in R&D activity in non-R&D intensive sectors compared to 2006. In contrast, in the R&D intensive manufacturing industry the share of SMEs engaged in R&D declined overall since 2006. However, the share of enterprises engaged in continuous R&D climbed slightly from 38 to 41%.

**Competitive pressure leads knowledge-based service companies to abandon R&D**

The declining proportion of enterprises engaged in R&D in knowledge-based service industry is due to various factors: increasing cost pressures cause innovation efforts to be more strongly oriented on short-term changes in demand and on short-term growth expectations, while fundamental innovation activities with strategic orientation lose importance. The SMEs surveyed in the KfW SME Panel reported that increasing competition in the past five years has led to more pressure on their sales prices in particular.<sup>18</sup> Compared to the manufacturing industry, however, in knowledge-based services this leads less frequently to a stronger focus on developing new products or tapping into new markets. In contrast, knowledge-based service companies are apt to invest more in the quality of existing products and specialise themselves in narrower market segments (see Chart 5). They prefer strategies in which their own R&D efforts have less importance.<sup>19</sup>

Enterprises without own R&D more frequently conduct innovation projects of shorter duration and incur less expenditures for innovation purposes without generating less income, as is shown by a

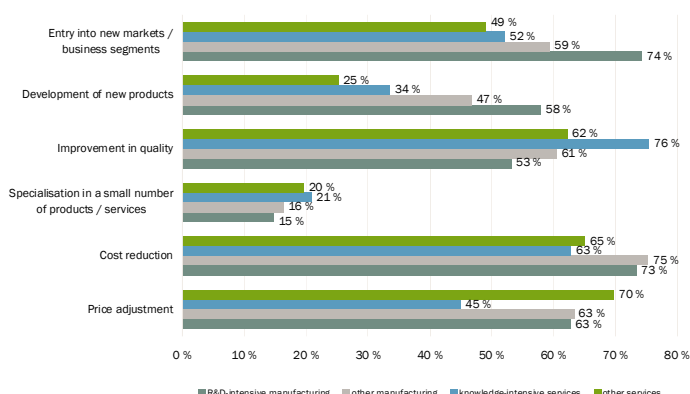
**Chart 4: Involvement in R&D according to economic sector**



Note: Extrapolated with the number of companies. Does not include companies with less than five employees

Source: KfW SME Panel.

**Chart 5: Competitive strategies against increasing price pressures according to economic sector**



Note: Extrapolated with the number of companies. Does not include companies with less than five employees

Source: KfW SME Panel.

In order to jump-start innovative activities across a broad basis it is necessary to overcome the uncertainties regarding the process and the consequences of the Euro crisis. Positive and stable sales expectations provide the necessary prospects for introducing innovations to the market. The most recent and greatly improved business expectations from the KfW-ifo SME barometer provides hope that (imitative) innovation activities might revive.<sup>21</sup> Furthermore, the specific barriers to innovation for SMEs show areas where economic policy can be applied. Financing problems, bureaucracy and a lack of qualified staff are the issues most often mentioned by SMEs – in particular by those with demanding innovation strategies.<sup>22</sup>

current study of ZEW.<sup>20</sup> Thus, from the companies' point of view, a competitive strategy which involves dispensing with their own R&D can be an interesting alternative. This can increasingly lead to the discontinuation of R&D activities precisely in those market segments where own R&D generally play a smaller role in the innovation process.

**Conclusion**

Following growth in the first half of the last decade and a sharp turning point in the course of the 2008/2009 economic and financial crisis, the innovation activity of small and medium-sized enterprises (SMEs) has not yet recovered. In particular, the proportion of enterprises with products

imitations declined, resulting in innovations being more slowly diffused. This has a negative impact on structural change and competitiveness for the entire spectrum of SMEs.

Of particular concern is the almost continuous decline in product innovators with market innovations in the past decade and their increasing focus on the manufacturing industry, as this concerns a trend independent of economic development. If market novelties are no longer developed and own R&D activities discontinued, this leads to a loss of important know-how that is key to securing a technological advantage and hampers any resumption of original innovation activity.

In light of the expected still weak economic outlook for the coming year and the ongoing consolidation of the financial sector it is necessary to ensure innovation financing and, if possible, even expand it. Moreover, the regular examination of existing legal provisions and administrative procedures can contribute to further improving the framework conditions for innovations. Last but not least, the difficulties in recruiting qualified staff for innovation tasks is likely to increase in the future due to demographic change. Measures to further qualify and train staff will likewise gain increasing importance in terms of promoting innovation. ■

<sup>1</sup> See Vöpel, H. and J. Uehlecke (2009): Wissen schafft Wachstum. Wirtschaftspolitische Handlungsoptionen für Innovation und Fortschritt. Hamburgisches WeltWirtschaftliches Institut, Paper 1–13.

<sup>2</sup> Triade patents are patents filed with the European, United States and Japanese patent office.

<sup>3</sup> Base year: 2010, current value for OECD comparison.

<sup>4</sup> Source: Stifterverband.

<sup>5</sup> Particularly on car manufacturing (32.8 %) and mechanical engineering (10.9 %). See also Gehrke, B. and U. Schasse (2011): Sektorstrukturen der FuE-Aktivitäten im internationalen Vergleich. In: DIW (Institute for Economic Research) Quarterly Report 3/2011, Der Forschungsstandort Deutschland nach der Krise.

<sup>6</sup> See Gehrke, B. and O. Krawczyk (2012): Außenhandel mit forschungsintensiven Waren im internationalen Vergleich. Studien zum deutschen Innovationssystem Nr 11-2012.

<sup>7</sup> See Rammer, C. et al. (2012): Innovationsverhalten der deutschen Wirtschaft. Indikatorenbericht zur Innovationserhebung 2011 and Rammer, C. and B. Weisfeld (2008): Innovationsverhalten der Unternehmen in Deutschland 2006. Aktuelle Entwicklungen und internationaler Vergleich. Studien zum deutschen Innovationssystem No. 04-2008.

<sup>8</sup> The KfW SME Panel is an annual representative business survey with responses from between 10,000 and 15,000 SMEs with a annual turnover of up to EUR 500 million. In particular enterprises with less than five employees are included, which according to calculations based on the KfW SME Panel make up more than four fifths of SMEs in Ger-

many, and are usually not taken into consideration in comparable data sets. See Schwartz, M. (2012): [KfW-Mittelstandspanel 2012 \[KfW SME Panel\]: Strong Performance – Increasing risks](#).

<sup>9</sup> Whether or not another company has already implemented the same innovation is not considered. The assessment of the innovation from the perspective of the firm in question is the essential point. In order to ensure comparability of the calculated values with other data sources, the KfW SME Panel collects information on the share of innovators for a three year period. The definition corresponds to those of the Eurostat and the OECD, which are established in the Oslo Manual. At the beginning of the observation period the KfW SME Panel collects information on innovation activity every two years.

<sup>10</sup> Thus, the figure for 2006 refers to the share of enterprises which introduced innovations in companies in the period 2004 to 2006.

<sup>11</sup> For more details see Zimmermann, V. (2010): Innovation und Konjunktur, KfW-Research. Standpunkt No. 4, June 2010.

<sup>12</sup> See Zimmermann, V. (2010): Wie finanzieren Mittelständler ihre Innovationen? KfW-Research. Akzente No 23, April 2010.

<sup>13</sup> See Schwartz, M. (2012), *ibid*.

<sup>14</sup> The business expectation data collected on a monthly basis by the KfW-ifo SME barometer were aggregated to annual values.

<sup>15</sup> Due to the higher incidence of error in the extrapolation of sector results with the inclusion of enterprises with less than five employees, these are not taken into consideration in the analysis of sectors.

<sup>16</sup> See Zimmermann, V. (2012): [To be the leader of the Pack? Innovation strategies in the German SME sector](#), KfW-Research. Focus Economics No 11, November 2012, for the relationship between the innovation strategy pursued and the extent of R&D activities.

<sup>17</sup> The figures for the whole SME sector are 8 % and 11 % for enterprises engaged occasionally or continuously in R&D activities in 2002, 5 % and 6 % in 2011.

<sup>18</sup> Over two thirds of SMEs report increasing intensity of competition. Of this, between 74 % to 93 % (depending on economic sector) report increasing price pressures. Does not include companies with fewer than five employees.

<sup>19</sup> See Zimmermann, V. (2012), *ibid*.

<sup>20</sup> See Rammer, C. et al. (2011): Innovationen ohne Forschung und Entwicklung. Eine Untersuchung zu Unternehmen, die ohne eigene FuE-Tätigkeit neue Produkte und Prozesse einführen. Studien zum deutschen Innovationssystem No. 15-2011.

<sup>21</sup> See KfW-ifo-Mittelstandsbarometer,.: December 2012.

<sup>22</sup> See Zimmermann, V. (2012): [Barriers to innovation in SMEs](#), KfW-Research. Focus Economics No. 6, September 2012.