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Innovation Activities in the German Economy

Report on indicators from
the innovation survey 2000

ZEW

Zentrum für Europäische
Wirtschaftsforschung GmbH



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■ In light of the continuous economic growth, which is fuelled by demand for exports, the German economy has further increased its innovative efforts. The share of innovative enterprises increased in all observed sectors in 1999. Following a long-lasting climb it reached 66% in manufacturing, which is very high in compari-

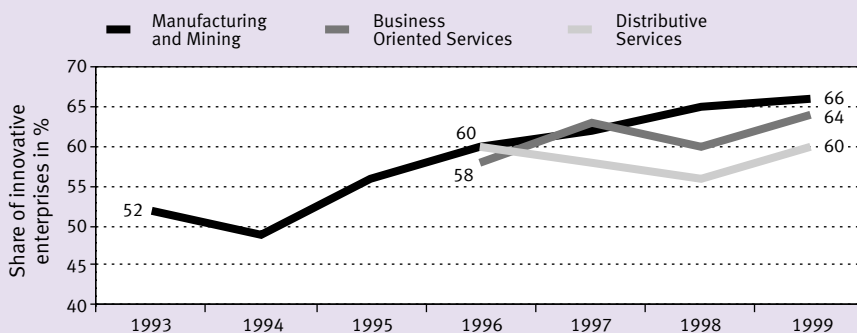
also reflected in innovation expenditure. A considerable increase in the expenditure on innovative projects can be assumed for the year 2000, due to the large amounts spent on UMTS licences in the telecommunications sector. This once-off effect is limited to business oriented services and will not continue in the following years.

market novelties to turnover, attention must be drawn to another striking difference: rationalisation motives only play a minor role for process innovations. Far less than 20% of services enterprises were able to realise cost reductions in 1999 through process innovations (in manufacturing it was well over 35%). This was also reflected by the amount of rationalisation which took place. In 1999 business oriented services were able to save less than 4% of their costs through process innovations – for distributive services this saving was only 2.5%. The figure for industry in general was 7%.

The innovative activities of East German industrial enterprises correspond on the whole to that of their West German counterparts. The success of innovations also clearly improved in 1999. Market novelties' share of turnover increased by 7% in comparison with the previous year. Even when considering the differences in the enterprises' size structure, the share of turnover is just smaller than the West German value.

A weakness of the East German innovation system lies in business oriented services, where impulses for the entire innovation process usually come from. Important innovation indicators are far behind the overall German average. The share of innovative enterprises is comparatively low at 56% despite an increase in comparison with the previous year and innovation expenditure is stagnating. The share of enterprises with market novelties and the connected share of turnover has risen greatly, but from a very low starting point. In

Innovation Activities 1993 to 1999



Source: ZEW (2001): Mannheim Innovation Panels.

Note: All information is expanded for the German statistical population. Provisional values for 1998 and 1999; those for the service sector are only available since 1996.

son with other countries. After a decline in the previous year the share of innovators in the service sector has also increased: by 64% in services which work closely with industry (e.g. banks, insurance enterprises, EDP, technical and consultancy enterprises – henceforth referred to as business oriented services) and by 60% among distributive services like trade and transport. The vast majority of enterprises seem well equipped to deal with the threatening economic downturn through the use of innovative products, services and production processes.

This is also illustrated by the expenditure by enterprises on innovative projects. It too has dramatically increased, amounting to approximately 163 milliard Marks in 1999. The improved liquidity of enterprises as a result of their relatively good sales allowed an increase of the budget for innovation. In contrast to their distributive counterparts, business oriented services have continually increased their innovation expenditure over the years, even in relation to sales; in other sectors this ratio remains almost constant. With the exception of business oriented services, the innovation budget for most enterprises is directed by their sales, hence economic developments are

Enterprises are also increasingly prepared to finance more risky innovation projects. Market novelties now form a considerable share of German enterprises' product portfolios. In 1999 more than 40% of manufacturing enterprises developed and introduced such market novelties. The share of enterprises in the service sector with market novelties has also risen considerably, accompanied by a strong increase in R&D activities. More than 35% of business oriented services were able to introduce services in 1999 which were new to the market.

This was also reflected in the structure of turnover. Since 1999 more than 9% of turnover in industry in general has been achieved through market novelties. In both the business oriented and distributive services, at 6% and 5% respectively, it was clearly lower than this average. In all sectors, turnover due to market novelties in 1999 has risen in comparison with the previous year. Up to now the German economy clearly needed to catch up with its European contemporaries. But now it is top class in this area too.

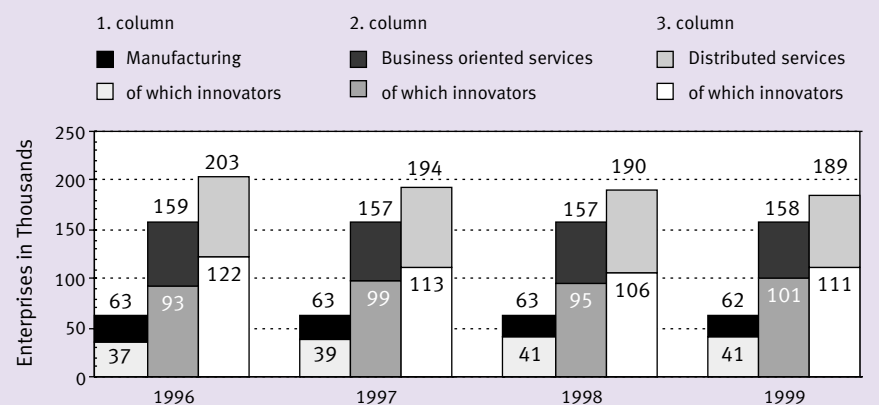
On the whole, the service sectors have brought themselves into line with the industrial sector in terms of innovation activities. Apart from the clearly lower contribution of

Innovators

Innovators are enterprises that have successfully completed at least one innovative project within a three-year period i.e. have introduced at least one innovation. Whether or not another enterprise has already introduced the same innovation does not matter; all to be considered is if it is an innovation for the enterprise in question.

Innovations may be in the area of products, services, processes or procedures. The basic definitions and boundaries correspond to those set out by the OECD in the so-called Oslo manual.

Enterprises and Innovators 1996 to 1999



Source: ZEW (2001): Mannheim Innovation Panels.
 Note: All information is expanded for the German statistical population. Values for 1998 and 1999 partly provisional.

this case East and West Germany are not yet converging.

The following sections illustrate in detail different aspects of German enterprises' innovative behaviour: innovation and research activities, innovation expenditure as well as innovation success. Indicators for business oriented and distributive service sectors will be shown separately, as now and again there are considerable differences between the two. Additional information is to be found on the ZEW home page at <http://www.zew.de/inno>.

Development and Structure of Innovation Activities

In 1999 innovative activities among German enterprises in the manufacturing sector as well as distributive and business oriented services increased in comparison with the previous year. The development of the economy, which has been positive up to now, along with increasing demand abroad and continuing economic growth has stimu-

lated enterprises to invest in projects for the future.

This is to be seen particularly in the increased share of innovative enterprises in all observed sectors. Almost two-thirds of manufacturing enterprises renewed or significantly improved their products and production processes in 1999. Since the middle of the Nineties the share of innovators in industry has constantly increased. However starting from a high level in 1998, the rise in 1999 was 1% lower than that in the previous year. Still the number of innovators remained constant at around 41,000 enterprises. The exit of non-innovative enterprises from industry alone was enough to cause this renewed increase in the share of innovators.

The traditionally research-intensive branches like the chemical industry or manufacture of medical, precision and optical instruments were the main contributors to the high share of innovators. They were able to increase the share of innovative enterprises to well over 80%.

In East German industry during the „catch-up“ period with the West, the share of innovative enterprises was up until the middle of the Nineties well above that in West Germany. Since 1997 the share of innovators in the manufacturing industry has developed in line with the West, even though the East still has a slightly lower level than the West, due to a considerably higher share of SMEs

In the German service sector the share of innovators rose in 1999 after a fall the previous year. The number of innovative enterprises among business oriented services rose above 100,000 for the first time. With an almost constant total number of enterprises this corresponds to 64% of all enterprises in the sector and means a climb of 4% in comparison with 1998.

In East Germany business oriented services developed far slower than those in the West. The share of innovators in 1999 was 56%, some 8% below the value for Germany as a whole. Admittedly, the share of innovative business oriented services has risen in the last two years. Still, with a low total of 13,000 innovators in the business oriented service sector, there is still no convergence with the West.

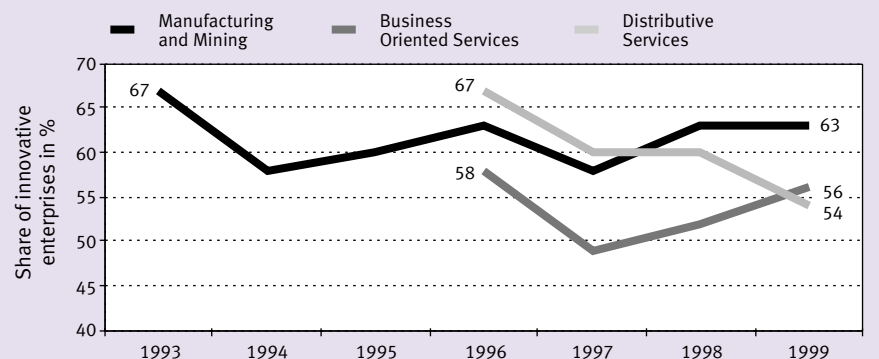
For the first time since 1996, both the share and the number of innovative enterprises in the distributive services increased in Germany. In 1999 the share amounted to 60% and while the overall number of enterprises was falling the number of innovative trade and transport enterprises rose from 106,000 in 1998 to 110,000.

However the positive development in the distributive service sector can be attributed to West German enterprises alone. In the East both the number and the share of innovative enterprises fell in 1999. Just over half of all East German trade and transport enterprises are innovative. They were unable to maintain the high share of innovators which they had in 1996.

Germany as a whole seems to be through the worst, as was foreseeable in 1998 when the share of distributive service enterprises that introduced new (or significantly improved) services rose again. For industrial enterprises and business oriented services the share of product innovators has been rising gradually since the mid Nineties. A clearly rising tendency in all sectors is now unmistakable.

Product innovations in this sense include improvements that have been taken over by other enterprises and hence can be contrasted to market novelties, because they

Innovation Activities in East Germany 1993 to 1999



Source: ZEW (2001): Mannheim Innovation Panels
 Note: Provisional values for 1998 and 1999 and available for services sectors since 1996. All figures expanded for the German statistical population.

contain a certain element of imitation. Enterprises engaging in product innovation rely less on imitation, are increasingly prepared to finance risky innovation projects and develop market novelties in increasing amounts. In 1999 the share of enterprises which introduced market novelties increased significantly more in all sectors than the share of product innovators.

In manufacturing more than 40% of all enterprises introduced at least one market novelty and hence the share of industrial enterprises with market novelties rose by more than 10% in comparison to 1998. Almost two-thirds of product innovators in manufacturing have market novelties as part of their product range.

In the service sector too there has been a swing towards novelties. Business oriented services have narrowed the gap to 5 percentage points to manufacturing in terms of the share of enterprises with market novelties. Far more than 35% have introduced such novelties; among technical services e.g. engineers, this was more than 45%. This share has increased for distributive services too and now amounts to more than 20%.

The situation is different however for the East German service sector: the share of enterprises with market novelties among both the business oriented and distributive services is almost 10% less than the figure for Germany as a whole. It seems that in this case East German services have not yet caught up. The innovative activities of East German services alone are not yet self-supporting.

In contrast to the shares of enterprises with product innovations and also with market novelties, the share of process innovators in Germany varies quite considerably with time. New production processes or procedures for the production of services are implemented on an irregular basis.

Just half of all industrial concerns implemented new processes and procedures in 1999, somewhat less than the previous year. However, the share of process innovators within the distributive and business oriented service sectors rose again in 1999. Business oriented services differ little to manufacturing enterprises in this respect and distributive services neared to 50% mark by five percentage points in 1999.

Process Innovators

Process innovations are new or significantly improved production technologies and methods of supplying and delivering products, or procedures which have been introduced within a enterprise. New processes or procedures which are sold to other enterprises are product innovations. Cost-reducing process innovations are those which lead to a reduction in average costs and which tend to have a rationalisation motive as their basis. They will therefore also be called rationalisation innovations.

In spite of this, process innovations in the service sector differ considerably from those in manufacturing in terms of their goals.

While a large amount of process innovations in industry are used to reduce costs and therefore serve the purpose of rationalisation, in the service sector they are more often due to the introduction of new services.

Far over a third of manufacturing enterprises (37%) reduced costs through process innovations. In industry, a good three quarters of process innovators also implement rationalisation procedures.

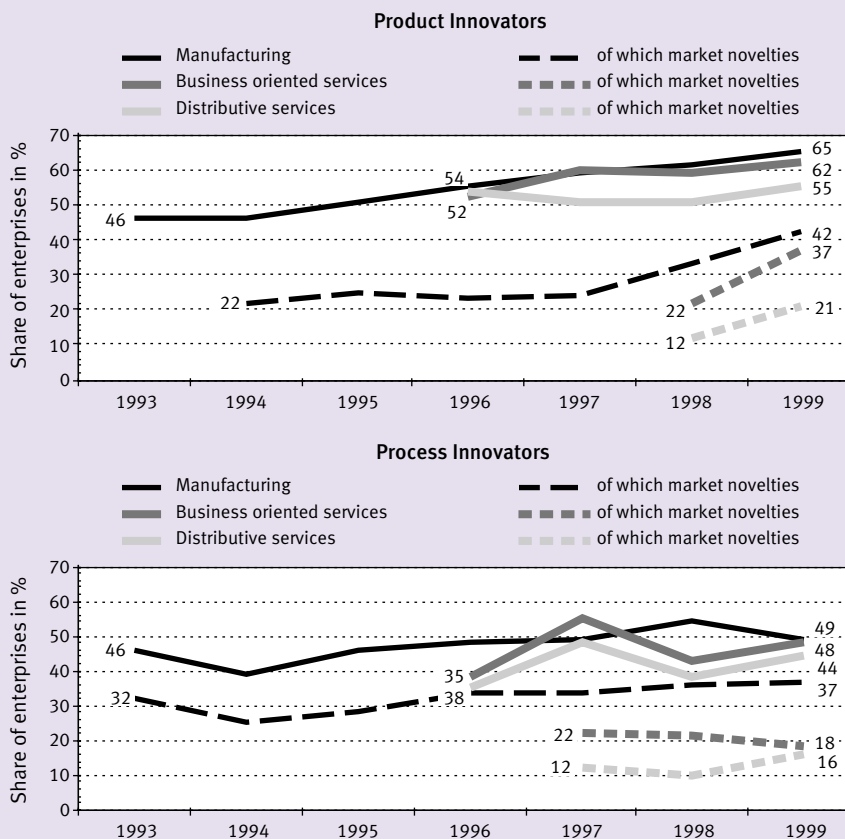
In the service sector, only every fifth business oriented service enterprise used new or significantly improved processes to reduce costs in 1999. This share has fallen constantly since 1997. For distributive services the rationalisation motive has increased in importance; even so, only every seventh enterprise reduced its costs through process innovations in 1999.

This is not true of all parts of the distributive service sector however. An explicit exception is the wholesale trade, where the motive of rationalisation plays an important role. Almost every fourth enterprise (24%) reduced its costs through process innovations in 1999.

Product Innovators

Product innovations are new or significantly improved products or services introduced to the market by an enterprise. On the other hand market novelties are new or significantly improved products or services introduced to the market for the first time by an enterprise. The enterprise defines the relevant market.

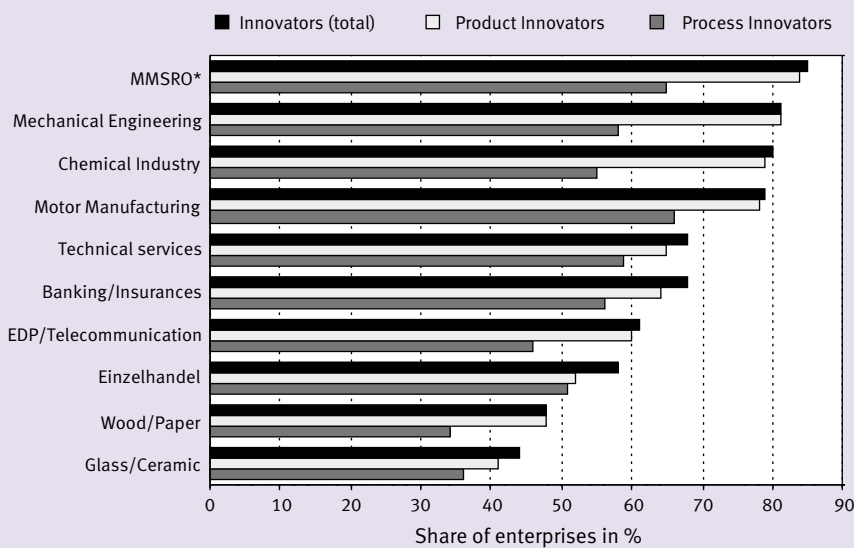
Product and Process Innovations 1993 to 1999



Source: ZEW (2001): Mannheim Innovation Panels.

Note: Values for 1998 and 1999 are provisional and only available for the service sector since 1996. Statistics on market novelties in manufacturing were first acquired in 1994 and for the service sector in 1998. Cost-reducing process innovations were first investigated in 1997. All values expanded for the German statistical population.

Innovation Activities in Selected Sectors 1999



Source: ZEW (2001): Mannheim Innovation Panels.
 Note: Values are provisional. All figures are expanded for the German statistical population.
 *manufacture of medical, precision and optical instruments.

Development and Structure of R&D Activities

Research and development (R&D) is becoming increasingly important to the innovation process, even though there is a considerable move from R&D to more market-near innovation activities within manufacturing. Almost seven out of ten innovative enterprises occasionally conducted their own R&D in 1993; in 1999 this had fallen to only five or six in ten.

While the share of innovative enterprises in manufacturing has constantly increased in the Nineties, the share of enterprises con-

ducting R&D has been subject to fluctuations. In 1999 this share rose slightly in comparison with the previous year to 37% and a gradually increasing trend can be seen.

Within enterprises conducting R&D there has been a shift from occasional to continual R&D. More than 20% of industrial concerns, which amounts to more than one in every two enterprises conducting R&D, now research on a regular basis.

The enduring high share of enterprises conducting R&D in East Germany is worthy of note; it surpassed that in the West throughout the Nineties and at 44% in 1999 it was clearly higher than that in West Germany. This is markedly true of continuous R&D. Almost 30% of East German industrial concerns researches permanently; the impact of extensive R&D support for East Germany shows itself in this fact.

In the German service sector R&D activity rose considerably in 1999. 18% or almost 28,000 of business oriented service enterprises conducted R&D, far more than in 1998, with more than 10% researching continuously. As is to be expected those most committed to research are EDP and the telecommunications sector and technical services, where 23% and 31% of enterprises respectively conduct research. In these sectors the share of continuous R&D is also particularly high; 95% of researching EDP and telecommunication enterprises did so on a regular basis in 1999.

The share of enterprises conducting R&D increased in the distributive service sector by more than 8% and by almost 15% in East Germany as well. To conclude that research and development also has a higher importance in the tertiary sector would be somewhat premature; the R&D in services which increased most (and significantly more than continuous R&D) was of an occasional nature. It remains to be seen to what extent this will develop into a trend towards more R&D within the service sector.

It should also be remembered that a considerable number of distributive service enterprises e.g. wholesalers are increasingly taking over functions normally covered by manufacturing. Part of R&D activity is connected with this new functions. The focus of certain industrial enterprises has also shifted, so that they have moved to the service sector. The borders between the sectors of industry and service are becoming visibly blurred.

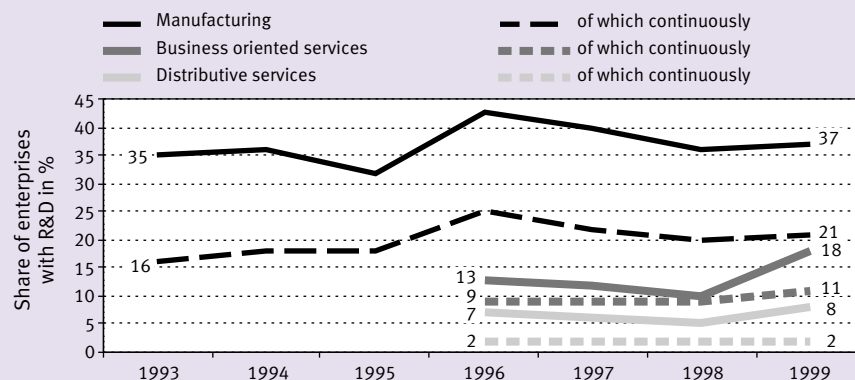
R&D Activities

Research and development (R&D) is to be understood as creative systematic work in order to increase the stock of knowledge and the use of this knowledge to devise new applications. R&D refers therefore to technical and/or organisational features of new products, services, or processes to develop them. These include constructing and testing prototypes, developing software (if this leads to a significant improvement) and acquiring the results of external R&D. Other examples are the development of new market research methods or organisational models and their testing. The definition corresponds to that of the so-called Oslo manual and hence also to the OECD's Frascati manual.

Development and Structure of Innovation Expenditure

R&D expenditure in the German economy rose sharply in the second half of the

Research and Development 1993 to 1999



Source: ZEW (2001): Mannheim Innovation Panels
 Note: Figures for 1997 were not gathered, are provisional for 1998 and 1999 and were available for the service sector from 1996. All figures are expanded for the German statistical population.

Innovation Expenditure

Innovation expenditure refers to spending within a given year on ongoing, concluded or abandoned projects. It includes ongoing spending (on personnel or necessary materials or services etc.) and expenditure on investment. It covers R&D expenditure, the conception of services or procedures for production, machines and materials, training or further training of staff, market test and introduction to market as well as other immaterial goods (e.g. software, patents), insofar as such expenditure is connected with an innovation project.

Nineties according to figures from SV-scientific statistics (SV-Wissenschaftsstatistik), for example from 1998 to 1999 by clearly more than 9%. The increase in total innovation expenditure turned out to be less. The German economy increased its innovation expenditure in the observed sectors by 5% to 163 milliard Marks in 1999, hence total innovation expenditure is more than twice as high as that on R&D, which according to the SV statistics amounted to 78 milliard.

According to their estimations in the middle of 1999, German enterprises will only moderately increase their innovation expenditure to some 164 milliard Marks in 2000. Distributive services are indeed reckoning with a decline in such expenditure. The planned values for 2000 have been estimated somewhat conservatively, as high expenditure on UMTS licences in the telecommunications sector have not been included. These will lead to a considerable increase in expenditure for business oriented services.

Service enterprises were the main contributors to the increase in innovation expenditure in 1999; business oriented services in particular continually increased such spending, with a more than 40% increase in comparison to 1996. A considerable share of this is attributable to EDP and telecommunications services, which spent 6 milliard Marks on innovation.

Developments in the service sector are accompanied by an East-West contrast. Contrary to the West German trend, innovation expenditure among business oriented services in the East is stagnating. On the other hand innovation expenditure in East German distributive services climbed by 25%, far above the rise in the West.

In manufacturing the dynamic of expenditure is somewhat similar in both East and West, with an increase of 4% in both regions; the clear difference in standards remains however. As in previous years, overall innovation expenditure in the observed sectors in West Germany surpassed that in the East more than twelve fold.

The rise in innovation expenditure in 1999 is particularly noticeable among small and medium-sized enterprises (SMEs). While SMEs were responsible for little more than 30% of innovation expenditure in 1997, this share continually increased to a value of more than 40% in 1999.

Nevertheless it is to be assumed that a large amount of the increase in expenditure can be attributed to the „millennium effect“ on EDP, especially for SMEs. In contrast to large enterprises, they tackled the problem of converting computers only shortly before the year 2000 began. Therefore the SMEs across all sectors assume a reduction in spending of some 5% in the year after the change.

In general the innovation budget was more often used for investment than in the previous year. The share of investments of total innovation expenditure rose by around five percentage points in manufacturing. This development shows a greater endurance of innovative efforts within German industry. The increase in the share of investment in business oriented services was two percentage points lower and for distributive services the emphasis lay slightly more on current innovation expenditure. Certainly the share of capital innovation expenditure invested is still high at more than 60%.

The increase in innovation expenditure in 1999 was accompanied by a comparable rise in turnover in most sectors, so increased spending can mainly be put down to the generally favourable economic conditions. This is reflected in the constancy of innovation intensity, which is measured as the share of innovation expenditure of turnover.

In contrast to the general development, innovation intensity rose for business oriented services by 0.2%. Since 1996 their spending per unit of turnover has risen continuously from 2.1% to 2.5%. Developments in EDP and telecommunication are

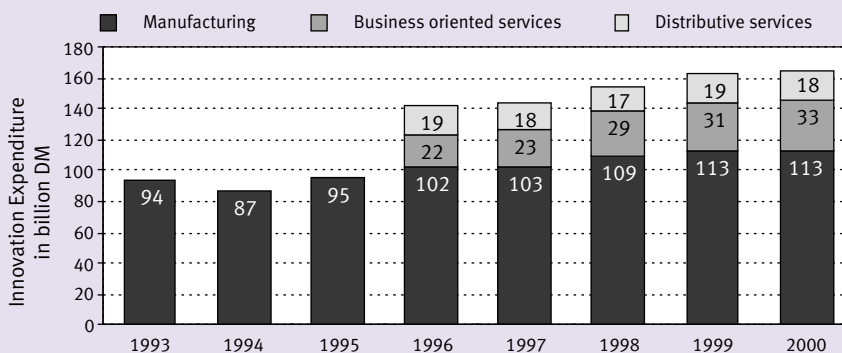
Turnover Share due to Product Innovations

Turnover share due to product innovations refers to turnover in a particular year which has been achieved through new or significantly improved products or services generated within the previous years. Business oriented services do not include banks or insurance for the purpose of calculations. The measurement of the turnover share was more comprehensive up to 1996, when it included turnover from products which were improved but not necessarily significantly improved. Figures before 1996 are therefore somewhat higher and not directly comparable with figures from 1996 onward.

SME

Small and medium-sized enterprises (SMEs) are enterprises with at least five and less than five hundred employees which dominate statistics on shares which refer to the number of enterprises due to their relatively strong presence. Their influence on expenditure and turnover however is limited.

Innovation Expenditure 1993 to 2000



Source: ZEW (2001): Mannheim Innovation Panels.

Note: Values for the service sector only available since 1996. Variations in the total due to rounding. Provisional values for 1998 and 1999. Figures for 2000 are plans/expectations of the enterprises. All figures expanded for the German statistical population

most noteworthy – they increased their innovation intensity by one percentage point to 5%, which makes them the sector with the highest innovation expenditure per unit of turnover out of all services. Contributions to this development come above all from mobile telephone and Internet access services but also from increasing competitive pressure in the sector.

Innovation intensity among distributive services has remained relatively constant since 1996 and now amounts to 0.9%. Developments within the service sector are certainly heterogeneous, with e.g. transport and postal services increasing their innovation intensity by half a percentage point to 2%. The climb in East Germany is also worthy of note. Distributive services here increased the intensity within a year by a quarter of one percent to 1.7% in 1999.

Innovation intensity in manufacturing barely changed in aggregate terms, however the differences between traditionally research-intensive branches and those less inclined have clearly fallen. In 1997 research-intensive sectors (e.g. pharmaceuticals, telecommunications, air and space travel) had at 7.5% almost three times as much innovation intensity than those industries with

less R&D (e.g. food, textiles and metal). This difference dwindled to a factor of two in 1999 (6% against 3%). This has two causes: sectors like textiles with relatively little R&D activities have significantly increased their expenditure in relation to turnover, and parts of research-intensive branches like chemicals have considerably reduced investment in innovations.

The East German manufacturing sector as a whole experienced a decline in innovation intensity. The share of innovation expenditure of turnover sank to below 5%, but was still just above the corresponding West German figure. This development was mainly due to an above average increase in the turnover of East German industrial enterprises. This improved turnover in the new Länder could obviously not produce any additional innovative impulse in this sector.

Extent and Structure of Innovative Success

The constancy of innovation intensity and hence of factor inputs to the innovation process face an improvement in output. The innovation activities of enterprises were affirmed by increasing success in the mar-

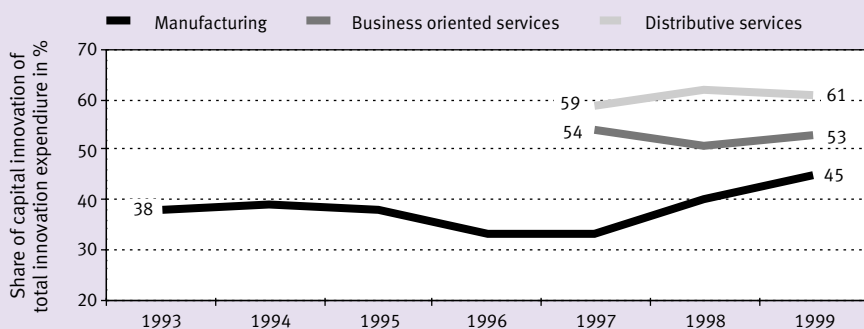
Turnover Share due to Market Novelties

Turnover Share due to market novelties refers to turnover in a given year from market novelties developed over the previous three years. Calculations for business oriented services do not include banks and insurance.

kets in 1999. Success of innovation is measured here as the share of turnover due to product innovations or market novelties. In 1999, the increase of the share of turnover due to product innovation in manufacturing, which has been rising since 1993, continued further. Its statistical reduction between 1995 and 1996 is down to a change in survey questions. Furthermore this growth has gained in momentum in the past year, with enterprises achieving 45% of their turnover in 1999 through new or significantly improved products, five percentage points more than the previous year and a full nine percentage points more than in 1996.

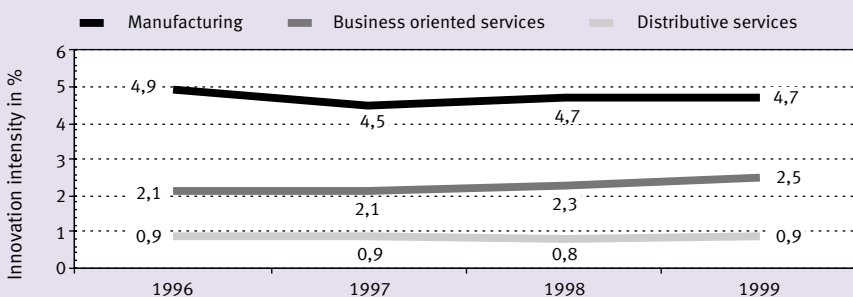
Similar development to that in manufacturing is to be seen in distributive services: here the rising share of product innovators is accompanied by a clear climb in the turnover share due to new or significantly improved services, from 21% in 1998 to 25% in 1999. In contrast to both manufacturing and distributive services, the efforts of business oriented service providers to offer their customers new or significantly improved services has led to a very low increase in the share of turnover, despite an increased share of innovation expenditure of turnover. This share remained relatively constant at 30% between 1997 and 1999; it must however be considered that development within the branches of the business oriented service sector occurs in different manners. For example, while consultants have been having less and less success with new services since 1997, growing modern service sectors such as EDP and telecommunications as well as technical services were able to further improve their high turnover share due to product innovations in 1999; the former from 50% to more than 55% and the latter from 35% to almost 40%. These branches are able to keep pace with top class sectors within manufacturing through their innovation success. EDP and telecommunications stand in fourth place behind the motor manufacturing industry, electrical engineering and the manufacture of medical, precision

Share of Investment of Total Innovation Expenditure 1993 to 1999



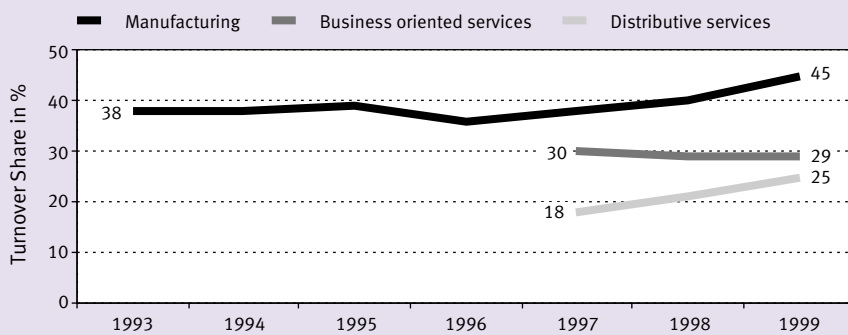
Source: ZEW (2001): Mannheim Innovation Panels. Note: Values for the service sector only available since 1997. Provisional figures for 1998 and 1999. All figures expanded for the German statistical population.

Share of Innovation Expenditure of Turnover 1996 to 1999



Source: ZEW (2001): Mannheim Innovation Panels. Note: Share excluding banks/insurance. Provisional values for 1998 and 1999. All figures expanded for the German statistical population.

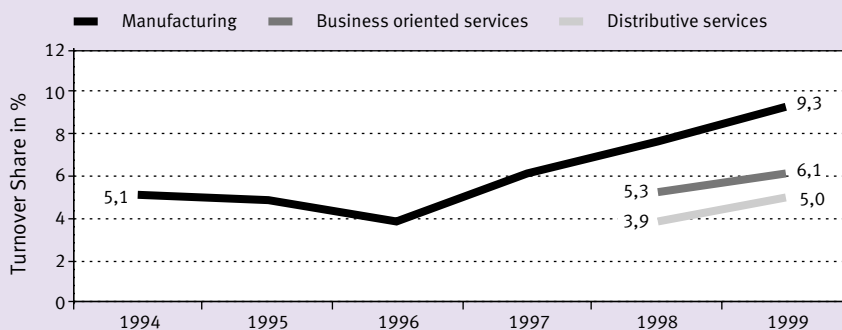
Turnover Share due to Product Innovations 1993 to 1999



Source: ZEW (2001): Mannheim Innovation Panels.

Note: Provisional values for 1998 and 1999. Values for the service sector not gathered before 1997 and do not include banks or insurance. From 1996 only limited comparability of turnover share in manufacturing from product innovation with previous years. All figures expanded for German statistical population.

Turnover Share due to Market Novelties 1994 to 1999



Source: ZEW (2001): Mannheim Innovation Panels.

Note: Provisional values for 1998 and 1999. Values for services sector not gathered before 1997 and do not include banks or insurance. From 1996 only limited comparison of proportion of turnover in manufacturing from product innovation with previous years. All figures expanded for German statistical population.

Share of Cost Reduction due to Process Innovations

Share of cost reduction refers to costs from the previous year which are reduced by cost-reducing process innovations from the preceding three years. The shares are weighted according to turnover and hence calculations for business oriented services exclude banks and insurance.

The success of market novelties is not just restricted to West Germany; in East Germany too, the turnover share due to market novelties has risen clearly, to around 7% in manufacturing and nearly 6% and 4% for business oriented and distributive services respectively. However West German enterprises continue to achieve a higher share of turnover due to totally new products or services. It remains to be seen if innovative success in both regions will converge in the medium term.

In contrast to product novelties, the growth in all three sectors of the turnover share due to market novelties is being caught up on by SMEs. For business oriented and distributive services this growth is just above that among big enterprises. However, as before, larger enterprises are more successful in terms of market novelties than SMEs: the turnover share due to market novelties for SMEs in all three sectors lies around one and a half percentage points below the overall average.

The success of process innovations is clearly more difficult to measure, as enterprises implement process innovations for various reasons. If they are introduced with a view to rationalisation, the share of costs

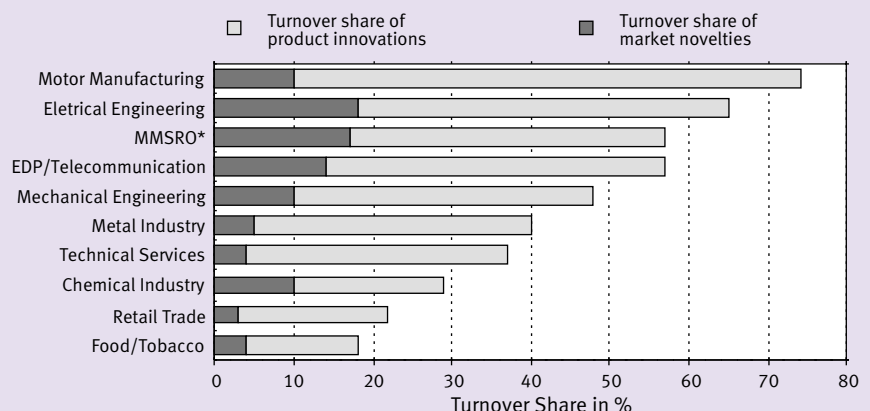
and optical instruments in terms of share of turnover. However it should be noted that differences in sector-specific product life cycles are reflected in the turnover share due to product innovations; when this increases it implies a shortening of the average duration of the product life cycle.

The positive development of innovation among SMEs in manufacturing and business oriented services did not continue. While the number of SMEs in both sectors bringing new products on the market increased in 1999, the turnover share due to product innovations did not rise; in manufacturing it remained unchanged at 32% and for business oriented services it even fell by two percentage points to 24%.

The described increase in the share of turnover is not only visible in product innovations (these include new or significantly improved products taken over from other enterprises) but also in market novelties. The turnover share due to market novelties increased in manufacturing in 1999 from 7.6% to 9.3%, which is more than twice the value in 1996. A similar tendency is also to be seen in both business oriented (from

5.3% to 6.1%) and distributive services (from 3.9% to 5.0%) even though the climb is not quite as big as in manufacturing. In all three sectors, two out of every ten Marks worth of turnover with product innovations are attributable to market novelties. In comparison, for manufacturing this figure was only one Mark in ten in 1996.

Turnover Share due to Market Novelties and Product Innovations in Selected Sectors 1999



Source: ZEW (2001): Mannheim Innovation Panels.

Note: Provisional values. All figures expanded for the German statistical population.

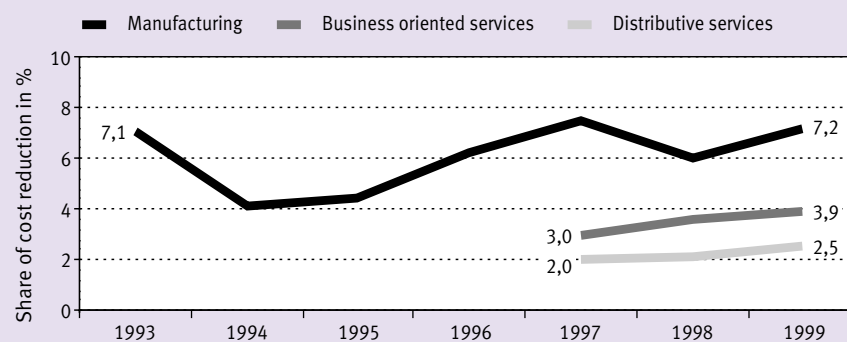
*manufacture of medical, precision and optical instruments.

saved on materials and personnel of total costs can be taken as an indicator for the efficiency of the process innovations. The share of cost reductions in manufacturing recovered after a slight reduction in the previous year and almost reached the peak value achieved in 1997. Enterprises were able to save around 7% of production costs in 1999 through new production facilities and techniques, as opposed to 6% the previous year. Hence the rise is considerably affected by cost savings in big enterprises; for SMEs the climb is more moderate, from 4.4% to 4.7%.

Cost-reducing process innovations are generally less meaningful in the service sectors than in manufacturing and hence cost-saving possibilities are fewer. Business oriented services saved around 4% of their production costs through new procedures in 1999; for distributive services this value was 2.5%.

The share of cost reduction has risen continuously in both service sectors since 1997, which is all the more astounding for business oriented services, as the share of enterprises introducing rationalisation in-

Cost Reduction due to Process Innovations 1993 to 1999



Source: ZEW (2001): Mannheim Innovation Panels.

Note: Provisional values for 1998 and 1999. Values not recorded for the service sectors before 1997. Share of cost-reduction exclude banks and insurance. All figures expanded for the German statistical population.

novations has constantly fallen in the same period. This share is mainly dominated by SMEs, while the cost-reduction share is controlled by large enterprises – for example, cost reduction for business oriented service SMEs continually fell from barely 4% in 1997 to just 2% in 1999.

There has been change in trend in East Germany – as the share of cost reduction fell in all three sectors in 1998, the effi-

ciency of rationalisation innovations rose in 1999. While there were no real differences between distributive services in East and West in 1999, East German enterprises in the business oriented service and manufacturing sectors continue to be less efficient in terms of rationalisation innovations. The current share of cost reduction is two percentage points below the corresponding West German value.

The Mannheim Innovation Panels (ZEW)

Since 1993 the ZEW has worked in conjunction with infas (Institute for applied social sciences) to gather information on innovative behaviour within the German economy on behalf of bmb+f. The information refers to all German enterprises with at least five employees from the manufacturing and mining as well as the distributive and business oriented services sectors. The term business oriented services covers banking, insurance, EDP (electronic data processing), telecommunications, technical services, consultancy and other services close to industry. Trade and transport services are also known as distributive services.

The stratified sample taken in 2000 covers around 11,700 enterprises, which are categorised according to sector, enterprise size and region (East and West Germany). The sampling frame used comes from data on enterprises previously prepared by CREDITREFORM.

The postal survey was conducted from March to September 2000, with some 4,000 enterprises participating in the survey. To correct any possible discrepancies in the answers, a further 2,000 enterprises were chosen at random from those which had not already responded in the survey and were questioned over the telephone about factors key to the survey.

The results are expanded for the German statistical population. The values for figures relating to the number of enterprises, employment and turnover between 1993 and 1998 are based on publications by the German Federal Department of Statistics (Statistisches Bundesamt). For 1999 the figures come from ZEW expansions and are hence provisional.

Due to large gaps in the official statistics, the population for the service sector from 1995 to 1997 was constructed using figures from

the Federal Department of Statistics, the German Central Bank as well as various federal supervisory boards and associations. The figures for 1998 and 1999 are partly based on expansions for this population by the ZEW and therefore provisional. The structure of size classes within the service sector is largely based on ZEW estimations. For the first time the ZEW had information at its disposal which made a more precise estimation of the structure of size classes possible in this report. This led to minor revision of the expansion of prior results. The development of indicators over this time was not influenced by this revision.

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Key figures of Innovation Activities in Manufacturing and Mining

	1993		1994		1995		1996		1997		1998		1999	
	absolute	in %	absolute	in %	absolute	in %	absolute	in %	absolute	in %	absolute	in %	absolute	in %
Firms (in Thousand)	71	100	70	100	65	100	63	100	63	100	63	100	62	100
of which:														
Innovators	37	52	34	49	36	56	37	60	39	62	41	65	41	66
of which:														
Product Innovators	33	46	32	46	33	51	35	55	37	59	38	61	40	65
Process Innovators	32	46	27	39	30	46	30	48	31	49	34	54	31	49
Firms with R&D	25	35	25	36	21	32	27	43	-	-	23	36	23	37
of which:														
Continuous R&D	12	16	12	18	12	18	15	25	-	-	13	20	13	21
Occasional R&D	13	19	13	18	9	14	12	18	-	-	10	16	10	16
Employees (in Thousands)	7.796	100	7.287	100	7.100	100	6.795	100	6.751	100	6.723	100	6.646	100
of which:														
Innovators	6.293	81	5.776	79	5.825	82	5.664	83	5.871	87	5.976	89	5.822	88
of which:														
Product Innovators	5.815	75	5.474	75	5.503	78	5.456	80	5.746	85	5.736	85	5.777	87
Process Innovators	5.746	74	5.118	70	5.185	73	5.053	74	5.402	80	5.502	82	5.259	79
Firms with R&D	5.503	71	5.156	71	4.991	70	5.280	78	-	-	4.863	72	5.043	76
of which:														
Continuous R&D	4.452	57	4.181	57	4.172	59	4.239	62	-	-	4.000	59	4.036	61
Occasional R&D	1.051	13	976	13	819	12	1.041	15	-	-	863	13	1.007	15
Innovation Expenditure (Bill. DM)	94	100	87	100	95	100	102	100	103	100	109	100	113	100
Share of Turnover in %	4,8		4,2		4,4		4,9		4,5		4,7		4,7	
of which:														
Current Innovation Expenditure	58	62	53	61	59	62	68	67	69	67	65	60	63	55
Capital Innovation Expenditure	36	38	34	39	36	38	34	33	34	33	43	40	50	45
Share of Firms with														
(in %)														
Market Novelties	-		22,0		24,7		22,6		23,6		32,6		41,8	
Cost Reduction	32,3		24,5		28,2		34,4		34,1		35,8		36,8	
Share of Turnover due to														
(in %)														
Market Novelties	-		5,1		4,8		3,8		6,1		7,6		9,3	
Product Novelties	38,2		38,0		38,7		36,0		37,6		39,9		44,7	
Share of Reduced Costs	7,1		4,1		4,4		6,2		7,5		6,0		7,2	

Source: ZEW (2001): Mannheim Innovation Panel – Manufacturing and Mining

Comments: “-”: Values not gathered for that year. Values for 1999 preliminary. Turnover share due to product innovations for 1996 and 1999 only a limited extent comparable to previous years. All information projected to the German statistical population.

Key figures on Innovation Activity in Distributive Services* 1996 - 1999

	1996			1997			1998			1999		
	absolute	in%		absolute	in%		absolute	in%		absolute	in%	
Firms (in Thousands)	203	100		194	100		190	100		185	100	
<i>of which:</i>												
Innovators	122	60	100	113	58	100	106	56	100	111	60	100
Product Innovators	110	54	90	98	51	87	97	51	92	102	55	92
Process Innovators	70	35	57	93	48	83	72	38	69	81	44	74
Firms with R&D	15	7	100	–	–	–	9	5	100	15	8	100
Continuous R&D	4	2	28	–	–	–	3	2	37	4	2	26
Occasional R&D	11	5	72	–	–	–	6	3	63	11	6	74
Innovation Expenditure (Bill. DM)	19			18			17			19		
<i>Share of Turnover in %</i>		0,9			0,9			0,8			0,9	
<i>of which:</i>												
Current Innovation Expenditure	–	–		7,3	41		6,4	38		7,4	39	
Capital Innovation Expenditure	–	–		10,4	59		10,5	62		11,7	61	
Share of firms with												
<i>(in %)</i>												
Market Novelties		–			–			11,5			20,9	
Cost Reduction		–			12,4			10,5			16,2	
Share of Turnover of												
<i>(in %)</i>												
Market Novelties		–			–			3,9			5,0	
Product Novelties		–			17,7			21,4			24,8	
Share of Reduced Costs		–			2,0			2,1			2,5	
<i>(in %)</i>												

Source: ZEW (2001): Mannheim Innovation Panel – Business oriented services.

Note: Deviations from total due to rounding. “–”: Values not gathered for this year. Turnover shares and cost-reduction excluding banks and insurance.

* Wholesale and Retail Trade, Transportation and Telecommunication including postal services

Key figures on Innovation Activity in Business Oriented Services* 1996 - 1999

	1996			1997			1998			1999		
	absolute	in%		absolute	in%		absolute	in%		absolute	in%	
Firms (in Thousands)	159	100		157	100		157	100		158	100	
<i>of which:</i>												
Innovators	93	58	100	99	63	100	95	60	100	101	64	100
Product Innovators	82	52	88	94	60	94	93	59	98	98	62	98
Process Innovators	61	38	65	87	55	88	68	43	71	75	48	75
Firms with R&D	21	13	100	–	–	–	16	10	100	28	18	100
Continuous R&D	14	9	68	–	–	–	14	9	85	18	11	64
Occasional R&D	7	4	32	–	–	–	2	2	15	10	6	36
Innovation Expenditure (Bill. DM)	22			23			29			31		
<i>Share of Turnover in %</i>		2,1			2,1			2,3			2,5	
<i>of which:</i>												
Current Innovation Expenditure	–	–		10,7	46		14,3	49		14,3	47	
Capital Innovation Expenditure	–	–		12,5	54		15,0	51		16,3	53	
Share of firms with												
<i>(in %)</i>												
Market Novelties		–			–			22,3			36,7	
Product Novelties		–			21,8			21,4			17,6	
Share of Turnover of												
<i>(in %)</i>												
Market Novelties		–			–			5,3			6,1	
Product Novelties		–			30,1			28,9			29,2	
Share of Reduced Costs		–			3,0			3,6			3,9	
<i>(in %)</i>												

Source: ZEW (2001): Mannheim Innovation Panel – Business oriented services.

Note: Deviations from total due to rounding. “–”: Values not gathered for this year. Turnover shares and cost-reduction excluding banks and insurance.

* Banking/Insurances, EDP and Telecommunication, Technical Services, Consulting, Advertising, Real Estate/Renting, Sewage and Refuse Disposal, other services close to industry.