Services in the Future

Innovation Activities in the Service Sector

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Survey 1999

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Innovation Activities in the German Economy

Business-related and Distribution Service Sectors: Survey 1999

■ Innovation activities in the service sector do not come up to expectations. In 1998, approximately 203 thousand service providers introduced new or significantly improved services, i.e. 58% of the enterprises, and 5 % points less than in 1994. Despite the declining share of innovators, innovation expenditure continue to increase. In 1998, 43 billion DM were spent on innovation activities, which is 3 billion DM more than in the previous year. This increment stems mainly from the increase among the large number of small and medium-sized enterprises.

The service sector is, however, very heterogeneous. Particularly two areas give cause for concern: distribution service providers in trade and transport in the old Länder (federal states of the former FRG), and business-related enterprises in the new Länder (federal states in the East of Germany). Companies in these problematic areas clearly demonstrate less innovativeness than others. The share of innovators among the business-related service enterprises increased again in the new Länder in 1998, whereas trade and transport in Western Germany probably reached its low point as late as in 1998.

Apart from the innovation input, a comprehensive evaluation of innovation activities also needs to include the companies' success with these innovations. Compared with manufacturing, the innovation success is – measured as turnover share due to new or significantly improved services or market novelties – relatively low. The share of cost reductions due to newly introduced processes is also distinctly below the corresponding value in manufacturing. Politicians should take such market signals more into account, when planning supporting measures.

Despite a continuously high unemployment rate, there is strong demand for highly qualified labour in Germany. For one out of seven service providers, the shortage of adequately qualified personnel hampers innovation activities. Consequently, the introduction of new services or processes is delayed or prevented, which in turn considerably affects their competitiveness. The shortage of adequately qualified personnel was increasingly felt in the past two years, and is meanwhile stated more frequently as a factor hampering innovation than the lack of financial resources.

The service sector principally seeks qualified personnel with computer expertise: skill shortage is reported particularly by companies carrying out high investments in information technologies (IT). However, this shortage includes not only specialists among software developers. The problem of shortage of qualified personnel increased sharply particularly in economic sectors, where the application of new technologies, especially in the IT sectors, has priority.

Qualified personnel from abroad can alleviate the problems only on a short-term basis. It has to be ensured in the medium and long-term that a well-qualified fresh generation of professionals is available in Germany itself. Particularly the increasing importance of qualification for innovation activities demonstrates that investments into the knowledge stock are an indispensable prerequisite for the future competitiveness of a national economy.

Reference Numbers of Innovation 1998

Share (in %) of Firms with	Share 1998	Changes compared to 1997	1996
Innovations	58	-1,3	-4,4
Product Innovations	55	0,8	-1,1
Process Innovations	40	-10,5	-0,6
Market Novelties	18	–	–
Cost Reduction	17	0,1	–
	Share 1998	**Changes compared to 1997**	**1996**
Share of Turnover due to Product Innovations	21,6	1,0	–
Share of Turnover due to Market Novelties	2,4	–	–
Share of Cost Reduction	2,4	0,2	–

Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: "-": Values not surveyed that year. Shares in per cent, changes in percentage points. Turnover Share w/o Banking/Insurances. Values preliminary. All information projected to the frame population in Germany.

Interviewed Service Sector Industries

The survey covers nearly the entire field of market-related services. The differentiation is based on the NACE classification of economic sectors (WZ93 of the Federal Statistical Office). Distribution as well as business-related service enterprises are object of the study. Distribution services encompass the economic sectors trade and transport, including postal and private courier services. The area of business-related services includes bank and insurance companies, electronic data processing (EDP) and telecommunication services, technical services, non-technical consulting services, such as legal, tax, and management consultancies as well as advertising and other services. Other services include estate and housing services, rental, industrial cleaning, and sewage or waste disposal. Services which are predominantly related to households or persons as well as services provided by the state are not included in this survey.

Development and Structure of Innovation Activities

In 1998, approximately 203 thousand companies introduced new services onto

the market or new processes in companies in order to produce or deliver such services. Compared with the strong growth in manufacturing, where the share of innovators increased by about 15 % points since 1994, the service sector turns out to have far lower annual changes. The overall trend, however, is quite obvious: on average, the share of innovators decreased slightly, yet regularly by 1 % point per year in all observed service sectors.

The steady development of the average share of innovators conceals, however, that the service sector is far more heterogeneous than manufacturing. For this reason, we distinguish between two groups of economic sectors: the distribution service sector includes the economic sectors retail, wholesale trade and sale of motor vehicles, as well as transport and postal services (trade and transport). Remaining services excluding trade and transport are subsumed in the business-related service sectors. Their innovation behaviour deviates, in some cases considerably, from that of the companies of the first group.

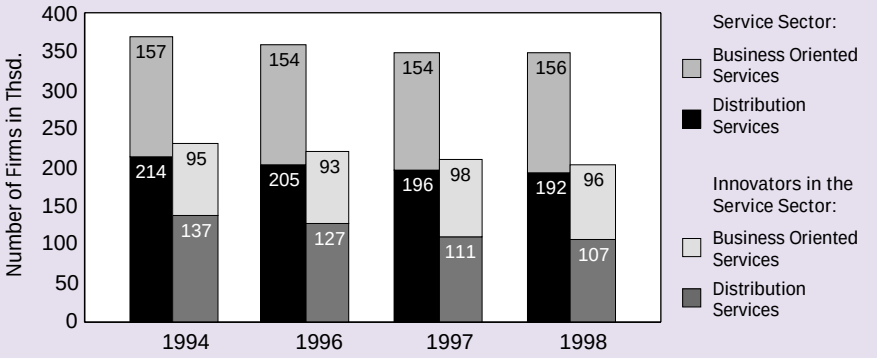
The decline of the number of firms as well as of the number of innovators is particularly attributable to distribution services, and there it stems mainly from retail trade. One third of the 348 thousand service providers have their main economic focus in retail trade. This economic sector thus clearly dominates the general development: there the number of innovative companies has decreased by nearly 30 thousand (approximately 30%) since 1994.

The group of remaining business-related services, however, also reveals considerable differences between individual economic sectors. Despite distinct declines in the share of innovators, companies in banking/insurance, data processing as well as in telecommunication services continue to be the most innovative in 1998. Three out of four companies in these sectors introduced new services onto the market or implemented new processes. Not only do these sectors exceed the average share of innovators in the service sector, they also surpass the average value in manufacturing.

In the EDP and telecommunications sector, the share of innovators is declining. Whereas the number of innovators rose by 6% from 1996 to 1998, the overall number of companies in this sector experienced an even stronger increase during that period. Particularly companies of longer standing do not implement significant improvements of their products or processes on a continual basis. Companies, that are younger than three years, are actually innovators by definition, as all their services are new due to the low age of the firms, and therefore represent an innovation for the company.

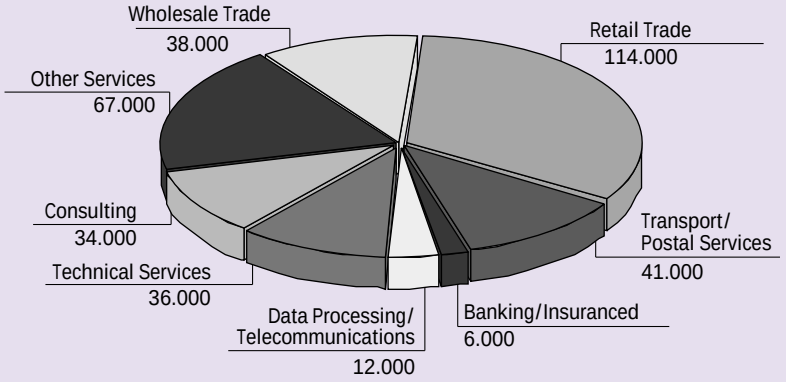
Product innovations experienced a favourable development. The share of product innovators as well as the absolute number of companies with new or significantly improved services rose slightly in the whole service sector for the first time. In 1998, about 192 thousand service providers (55%) introduced new services on the market. Business-related services (excluding trade and transport) increased their number of product innovators by 10 thousand companies as early as in 1997. In 1998, the share of innovative companies among all business-related service providers stabilised at last year's level of around 60%. This value corresponds more or less to the average in manufacturing. In

Number of Firms 1994 to 1998



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Values not surveyed for 1995, values for 1997 and 1998 preliminary. All information on innovators projected to the frame population in Germany.

Size of the Analysed Economic Sectors 1998

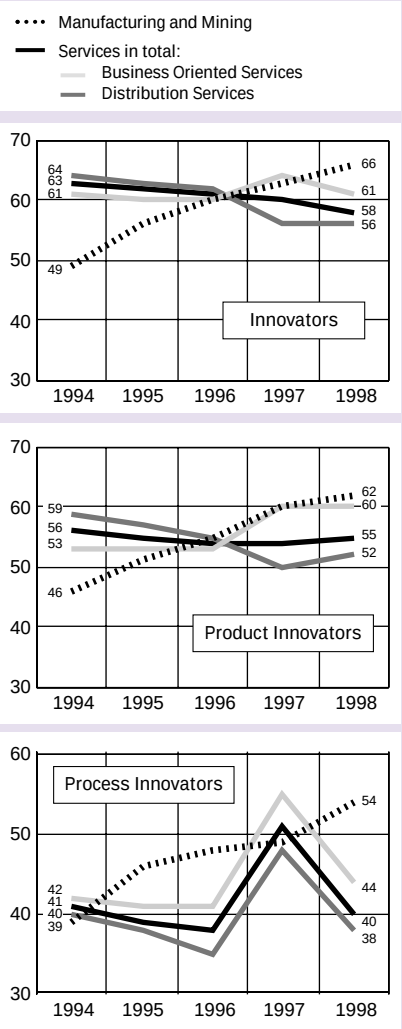


Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Number of enterprises per economic sector. Values preliminary.

Product and Process Innovations

Innovators are companies which have successfully implemented at least one innovation project within the last three years, i.e. they have introduced at least one innovation.
Innovations consist of service and process innovations. Service innovations are new or significantly improved services which a company has introduced onto the market.
Process innovations are new or significantly improved methods used in producing and delivering services, which are introduced in the company. Organisational changes constitute innovations only if they are directly related to a product or process innovation.
The definitions and differentiations comply with those of the OECD and Eurostat, set forth in the so-called Oslo-Manual.

Innovation Activities 1994 to 1998 (in %)



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Values not surveyed for 1995 in the Service Sector, values for 1997 and 1998 preliminary. All information projected to the frame population in Germany.

the distribution service sectors, the number increased one year later than in the other sectors and attained a share of 52% in 1998.

The influence of a trend reversal in product innovations cannot be underestimated in view of the interconnections with general innovation activities. In all analysed economic sectors of the service industry, innovation activities are strongly characterised by product innovations. 192 thousand (95%) out of the 203 thousand innovators introduced new or significantly improved services. The importance of product innovations increased particularly among business-related services (excluding trade and transport): from 1996 to 1998, the share of innovators, that introduced product innovations, rose from 88% to 97%.

The development of process innovations in the service sector varied strongly over the course of the years. In 1998, 140 thousand service providers introduced new methods in companies. Last year's large number of process innovators was not reattained. But, having an average value of 40%, this share still exceeds the 1996 value.

New methods for producing or delivering services are on the whole less important in the service sector (excluding companies in transport and postal services) than in manufacturing: only half of the approximately three quarters of the innovators implement new methods, compared to 80% in manufacturing.

A complementary telephone survey among selected firms revealed that the division between services (= product) and the applied methods to render these services usually does not pose any difficulties to companies. Companies describing themselves as process innovators in 1997, stated mainly new EDP equipment as an example for new methods that were introduced at this point of time.

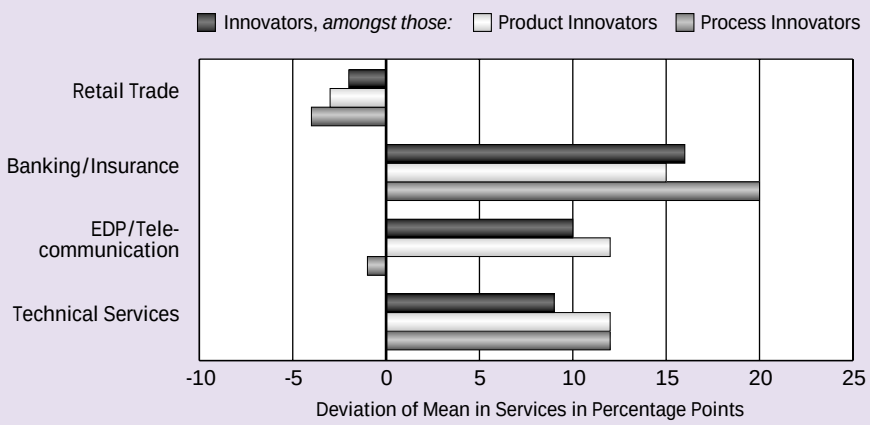
Research and Development

Research and Development activities (R&D) are a sub-section of a company's innovation activities. R&D is defined as creative, systematic work in order to expand knowledge and to apply it to new problems. R&D activities are by far not as important in the service sector as in manufacturing and mining. Whereas 38% of the industrial enterprises carry out R&D, the share of companies engaging in R&D in services is, on average, below 10%.

In addition, the share of R&D in the service sector has significantly decreased since 1994. What is more, service providers tend to implement R&D no longer on a steady basis. In 1994, as many as 30 thousand enterprises still carried out continuous R&D, while their number amounted only to a mere 20 thousand in 1998. This development can be observed in nearly all economic sectors.

Business-related service providers have the highest share of companies engaging in R&D. As expected, R&D is particularly wide-spread among technical services (among others engineering consultancies, institutes for technical, physical, and chemical analyses), where 3 out of 10 companies conduct R&D, most of them on a steady basis. Far behind those, EDP and telecommunications companies (17% R&D) follow.

Innovation Activities in Selected Branches 1998



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Values preliminary. All information projected to the frame population in Germany.

R&D Activities

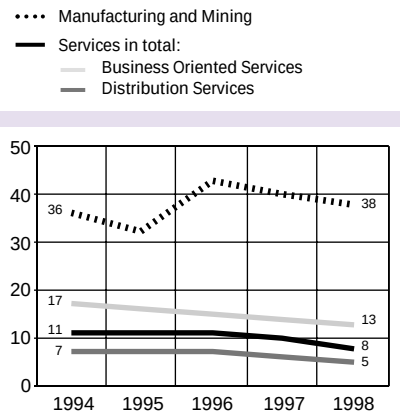
R&D comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge and to apply it to new problems. R&D is related to technical and/or organisational features of new services or methods to produce or deliver them. Examples of such R&D projects are software development, development of new market research methods or organisation models and their testing. This definition complies with the so-called Oslo-Manual and therefore also with the Frascati-Manual of the OECD.

Innovation Indicators for the Service Sector 1994 to 1998

	1994			1995			1996			1997			1998		
	absolute	*in %*		absolute	*in %*		absolute	*in %*		absolute	*in %*		absolute	*in %*	
Firm Structure (in Thsd.)															
Service Sector in total	371	*100*		368	–		360	*100*		350	*100*		348	*100*	
amongst those:															
Innovators	233	*63*	*100*	–	–	–	220	*61*	*100*	209	*60*	*100*	203	*58*	*100*
Product Innovators	209	*56*	*90*	–	–	–	196	*54*	*89*	190	*54*	*91*	192	*55*	*94*
Process Innovators	152	*41*	*65*	–	–	–	136	*38*	*62*	178	*51*	*85*	140	*40*	*69*
Firms with R&D	42	*11*	*100*	–	–	–	39	*11*	*100*	–	–	–	29	*8*	*100*
Continuous R&D	29	*8*	*70*	–	–	–	20	*6*	*52*	–	–	–	19	*6*	*67*
Occasional R&D	13	*3*	*30*	–	–	–	19	*5*	*48*	–	–	–	10	*3*	*33*
under them:															
Distribution Services	214	*100*		211	–		205	*100*		196	*100*		192	*100*	
amongst those:															
Innovators	137	*64*	*100*	–	–	–	127	*62*	*100*	111	*56*	*100*	107	*56*	*100*
Product Innovators	125	*59*	*91*	–	–	–	114	*55*	*90*	98	*50*	*89*	99	*52*	*92*
Process Innovators	85	*40*	*62*	–	–	–	73	*35*	*57*	93	*48*	*84*	72	*38*	*67*
Firms with R&D	15	*7*	*100*	–	–	–	15	*7*	*100*	–	–	–	10	*5*	*100*
Continuous R&D	10	*5*	*63*	–	–	–	4	*2*	*28*	–	–	–	4	*2*	*37*
Occasional R&D	6	*3*	*37*	–	–	–	11	*5*	*72*	–	–	–	6	*3*	*63*
Business Oriented Services	157	*100*		157	–	–	154	*100*		154	*100*		156	*100*	
amongst those:															
Innovators	95	*61*	*100*	–	–	–	93	*60*	*100*	98	*64*	*100*	96	*61*	*100*
Product Innovators	83	*53*	*87*	–	–	–	82	*53*	*88*	92	*60*	*94*	93	*60*	*97*
Process Innovators	66	*42*	*70*	–	–	–	63	*41*	*68*	85	*55*	*86*	68	*44*	*71*
Firms with R&R	27	*17*	*100*	–	–	–	24	*15*	*100*	–	–	–	19	*13*	*100*
Continuous R&D	20	*13*	*73*	–	–	–	16	*10*	*67*	–	–	–	16	*10*	*82*
Occasional R&D	7	*5*	*27*	–	–	–	8	*5*	*33*	–	–	–	4	*2*	*18*
Innovation Expenditure (in Bill. DM)															
Service Sector in total	–			35			37			40			43		
Share of Turnover in %		–			*1,1*			*1,1*			*1,1*			*1,1*	
under them:															
Current Innovation Expenditure	–		–	–		–	–		–	20		*40*	19		*43*
Capital Innovation Expenditure	–		–	–		–	–		–	20		*60*	25		*57*
under them:															
Distribution Services		–		18			18			18			15		
Share of Turnover in %					*0,9*			*0,9*			*0,9*			*0,7*	
under them:															
Current Innovation Expenditure	–		–	–		–	–		–	7		*58*	6,4		*43*
Capital Innovation Expenditure	–		–	–		–	–		–	11		*42*	8,4		*57*
Business Oriented Services	–			18			19			22			28		
Share of Turnover in %		–			*1,7*			*1,8*			*1,9*			*2,0*	
under them:															
Current Innovation Expenditure	–		–	–		–	–		–	13		*58*	12,3		*43*
Capital Innovation Expenditure	–		–	–		–	–		–	9		*42*	16,2		*57*
for comparison:															
Firms in Manufacturing and Mining (in Thsd.)		70	*100*		65	*100*		63	*100*		63	*100*		62	*100*
amongst those:															
Innovators	34	*49*	*100*	36	*56*	*100*	37	*60*	*100*	40	*63*	*100*	41	*66*	*100*
Product Innovators	32	*46*	*94*	33	*51*	*91*	35	*55*	*93*	37	*60*	*95*	38	*62*	*93*
Process Innovators	27	*39*	*79*	30	*46*	*82*	30	*48*	*80*	31	*49*	*79*	34	*54*	*82*
Firms with R&D	25	*36*	*100*	21	*32*	*100*	27	*43*	*100*	–	–	–	23	*38*	*100*
Continuous R&D	12	*18*	*49*	12	*18*	*56*	15	*25*	*57*	–	–	–	13	*20*	*54*
Occasional R&D	13	*18*	*51*	9	*14*	*44*	12	*18*	*43*	–	–	–	11	*17*	*46*
Innovation Expenditure in Manufacturing and Mining (in Bill. DM)	87			95			102			103			109		
Share of Turnover in %		*4,2*			*4,4*			*4,9*			*4,5*			*4,6*	
under them:															
Current Innovation Expenditure	53		*61*	59		*63*	68		*67*	69		*67*	66		*60*
Capital Innovation Expenditure	34		*39*	36		*37*	34		*33*	34		*33*	44		*40*

Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Deviation from total due to rounding errors. "-": Values not surveyed that year. Innovation Expenditure for 1994 comparable to following years only to a limited extent. Turnover Shares not including banking / insurances. Values for 1997 and 1998 preliminary. All information projected to the frame population in Germany.

R&D-Activities 1994 to 1998 (in %)



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Values not surveyed in 1995 (Services) and 1997 (Services and Manufacturing). Values preliminary. All information projected to the frame population in Germany.

The companies' willingness and opportunities to conduct R&D increase with their size. 38% of large enterprises carry out R&D, i.e. four times as often as in the case of small and medium-sized enterprises.

Development and Structure of Innovation Expenditure

Innovation expenditure in the service sector have been monotonously increasing since 1995, and growth has even speeded up in the past years. In 1998, total innovation expenditure amounted to 43 billion DM, i.e. 3 billion DM more than in the previous year. Interviewed service providers predict a similar amount of total expenditure for 1999. The experience gathered in the past innovation surveys demonstrates clearly that the expenditure expected by service providers in the current (survey) year were rather considerably exceeded by actually incurred expenditure. For this reason, projected values for 1999 in service sectors should be regarded as a rather conservative estimation.

The considerable increase in past years is mainly due to the business-related services (excluding trade and transport). In this sector, some innovation budgets grew rather significantly. Banks and insurance companies report the highest increment; they raised their expenditure by 4 billion DM.

This increase probably reflects the considerable efforts that were employed to introduce the Euro in interbank payments as well as the beginning attempts to prepare the companies for the turn of the year 1999/2000 and the expected problems. By contrast, innovation expenditure declined over time among distribution services. Particularly in retail trade, innovation expenditure were cut by 35% (approximately 2 1/2 billion DM) between 1995 and 1998.

Even though the analysed economic sectors in services comprise 5 times as many companies as manufacturing, they do not even attain half of the total innovation expenditure of manufacturing, amounting to almost 110 billion DM. Service providers allocate only about 1% of their turnover to innovation activities. This percentage is distinctly below the 4 1/2 % in manufacturing and mining. As the average innovation intensity remained unchanged over the years, the development of innovation expenditure reflects the progression of total turnover. Innovation expenditure increases proportionally to turnover.

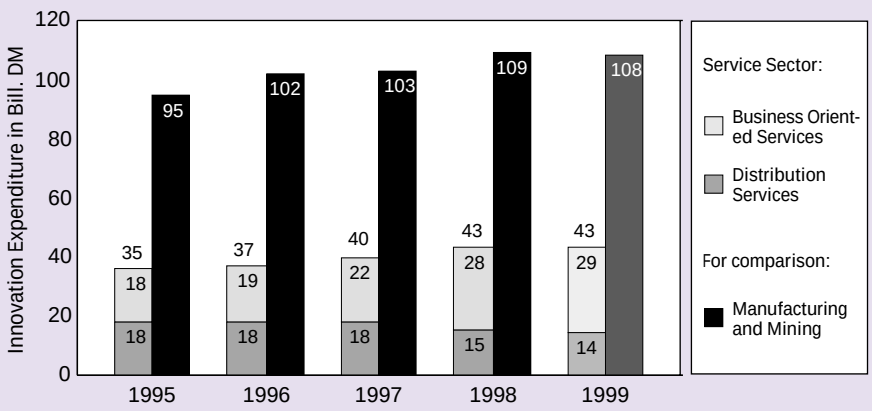
A differentiated picture emerges at the level of individual economic sectors. Particularly in retail trade, innovation intensity fell considerably. In 1995, almost 10 thousand DM out of each million DM of turnover were spent on innovation purposes, in 1998, however, this amount dropped to a mere 6 thousand DM.

With an innovation intensity of 0.6%, retail trade (together with wholesale business) is on the tail end of the service

Innovation Expenditure

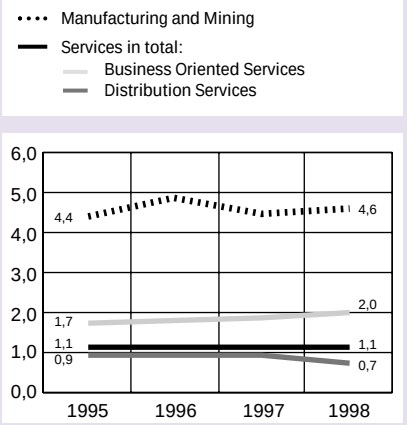
Innovation expenditure refer to expenditure for ongoing, completed, and abandoned projects within a given year. They comprise current expenditure (personnel costs, acquisition of materials and services, etc.), and capital expenditure.
This includes expenditure for R&D, conception of services or methods to produce and deliver the said, machines and equipment, employee training and further training, market tests, and market launches as well as other immaterial goods (software, patents), provided that this expenditure is linked with an innovation project.
The division of total innovation expenditure into current and capital innovation expenditure was effected for the first time in the 1997 survey. For this reason, we cannot demonstrate any developments yet.

Innovation Expenditure 1995 to 1999



Source: ZEW (2000): Mannheim Innovation Panel - Services.
Comments: Deviation from total due to rounding errors. Values for 1997 and 1998 preliminary. Values for 1999 are plans/expectations of firms. All information projected to the frame population in Germany.

Share of Innovation Expenditure in Turnover 1995 to 1998 (in %)



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Turnover shares not including banking/insurances. Values for 1997 and 1998 preliminary. All information projected to the frame population in Germany.

sector. One needs to take into account, however, that reduced lower value-added quotas are linked with reduced profit-turnover ratios. This relativises lower innovation intensities.

Among the other, rather business-related services (excluding trade and transport) innovation intensity is significantly higher: in 1998, approximately 20 thousand DM out of each million DM of turnover were used for innovation purposes. Not only do service providers in these branches spend twice as much for innovation projects as service sectors do on average, their turnover share has also continuously increased since 1995. The rise in innovation expenditure thus exceeds even the sales increase.

Size and Structure of Innovation Success

The analysis of the structure and development of innovation activities is closely linked with the question, to which extent the enterprises were successful with the introduction of new services (as product innovators), or with new methods to produce new services (as process innovators).

However, only a small part of product innovations is a genuine, creative innovation, i.e. a product new to the market. For this reason, a question was included in the recent survey, which, for years, has efficiently recorded the share of companies with market novelties in manufacturing and mining. The success of these service providers with product innovations and market novelties is measured on the basis of turnover due to these services.

Turnover share due to new or significantly improved services hardly changed in the service sector, compared to the previous year. Slightly more than 20% of turnover is generated with new services. Even though the share of product innovators in manufacturing is only 5% points above that one in the service sector, turnover share due to new products is nearly twice as high in this sector.

For some economic sectors, turnover share due to new services is significantly higher: EDP and telecommunications companies by far outdo even manufacturing with a turnover share of 46%. Having a turnover share of 30%, technical or consulting services are also above average in the service sector. Yet, the success with new services in the last-mentioned economic sectors has worn off. In 1998, their turnover share was 10% points lower than in the previous year.

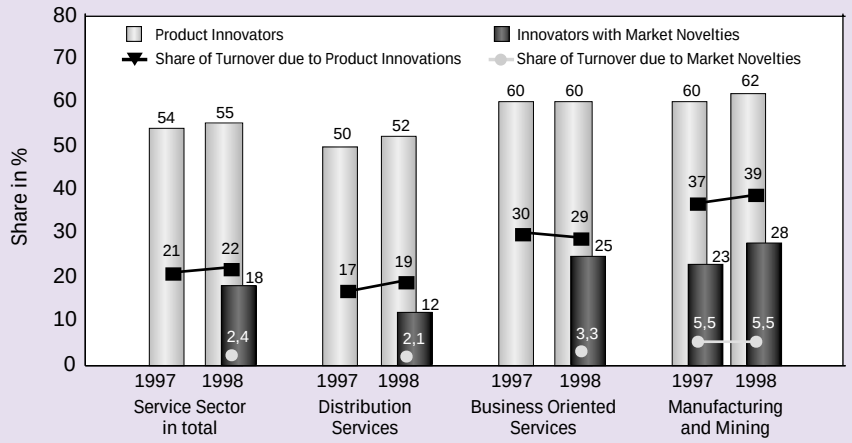
One out of five up to six service providers launched fundamentally new services on the market. It is hardly surprising that trade and transport show a significantly lower value, because services in the distribution branches, i.e. sales activities in retail trade, most likely will not release many market novelties. Business-related, dynamic service sectors (excluding trade and transport) accounted for 25% of enterprises with market novelties. Market novelties were reported most frequently in the economic sectors EDP and telecommunications as well as in technical services, where one out of three companies introduced innovations, which were new to the market.

Naturally, economic sectors with a high share of companies with market novelties generate a larger turnover share with these services. When measuring it in % points, the difference only seems to be minor. In fact, however, turnover share due to market novelties, for instance, in

Turnover Shares due to Product Innovations

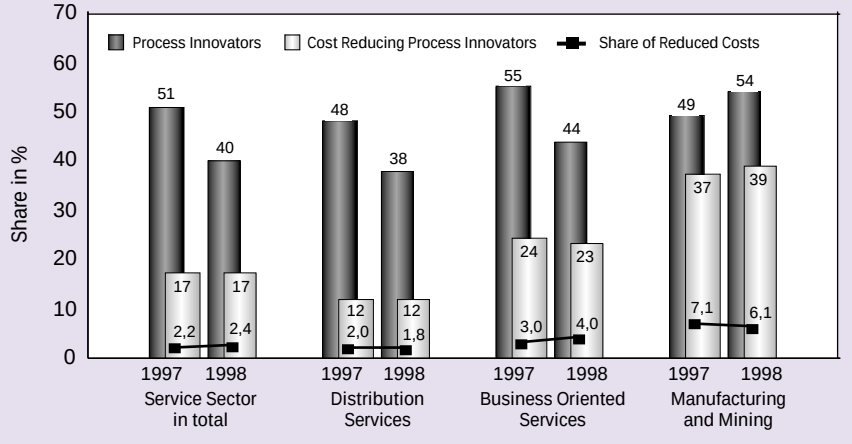
Turnover shares due to product innovations refer to the turnover of the respective year, which was generated with new or significantly improved services within the past three years. Bank and insurance companies were excluded from the calculation because there is no precise definition of turnover for these sectors comparable to turnover in other sectors. Data on turnover shares were gathered for the first time in 1997.

Product Innovations 1997 to 1998



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Turnover shares not including banking/insurances. Values preliminary. All information projected to the frame population in Germany.

Process Innovations 1997 to 1998



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Turnover shares not including banking/insurances. Values preliminary. All information projected to the frame population in Germany.

consulting services (3.2%), is one third larger than in the total service sector (2.3%). But even the turnover share in this economic sector is still far below the rate, which companies in manufacturing achieve with products that are new to the market (5 1/2 %).

Among service providers that introduced new processes in their enterprise to deliver or produce new services, i.e. the process innovators, the innovator shares reflect nothing more than the input side in the innovation process. When new processes are implemented to reduce costs of producing or delivering services, the efficiency of the new processes can be determined on the basis of actual cost reductions.

Compared to manufacturing, rationalisation measures assume only minor importance in services. With 17%, implementation of cost-reducing process innovations is less than half as high as in manufacturing. The fact, that fewer cost-reducing processes are implemented in the service sector should not be regarded as a weak point of the service sector: saving of costs is only one out of many motives for the introduction of new processes in a company. Obviously, other reasons assume priority for the introduction of new processes in the service sector, e.g. producing or delivering services by increased use of technology (e.g. Information and Communication Technology, ICT).

Distribution services have an even lower share of cost-reducing process innovators. Merely one out of eight enterprises applies new processes for cost reductions. Particularly in retail trade, savings potentials are likely to be largely exhausted after a few years of fierce competition.

Among other, rather business-related services (excluding trade and transport), the share of cost-reducing process innovators is between 20% and 30%. Even though the share of process innovators is clearly declining, the share of cost-reducing process innovators remains constant. The relative importance of cost-reducing process innovations has thus increased. One needs to take into account, however, that the share of process innovators in 1997 turned out to be extraordinarily high for service providers.

Reference Numbers of Innovation Results 1997 to 1998

(Information in %)	1997		1998	
Service Sector in total				
Share of firms with				
– Product Innovations	54,4		55,2	
Share of Turnover due to Product Novelties		*20,6*		*21,6*
– Market Novelties	–		17,7	
Share of Turnover due to Market Novelties		*–*		*2,4*
– Cost Reduction	17,1		17,1	
Share of Reduced Costs		*2,2*		*2,4*
under them:				
– Distribution Services				
Share of Firms with				
– Product Innovations	50,1		51,7	
Share of Turnover due to Product Novelties		*17,4*		*19,0*
– Market Novelties	–		12,0	
Share of Turnover due to Market Novelties		*–*		*2,1*
– Cost Reduction	11,7		12,4	
Share of Reduced Costs		*2,0*		*1,8*
– Business Oriented Services				
Share of Firms with				
– Product Innovations	59,8		59,5	
Share of Turnover due to Product Novelties		*29,9*		*28,9*
– Market Novelties	–		24,7	
Share of Turnover due to Market Novelties		*–*		*3,3*
– Cost Reduction	23,9		23,0	
Share of Reduced Costs		*3,0*		*4,0*
for comparison:				
Manufacturing and Mining:				
Share of Firms with				
– Product Innovations	37,5		38,1	
Share of Turnover due to Product Novelties		*37,0*		*39,5*
– Market Novelties	23,4		28,5	
Share of Turnover due to Market Novelties		*5,5*		*5,5*
– Cost Reduction	37,2		38,6	
Share of Reduced Costs		*7,1*		*6,1*

Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Market Novelties surveyed 1998 for the first time. Turnover shares and shares of reduced costs not including banking/insurances. Values preliminary. All information projected to the frame population in Germany.

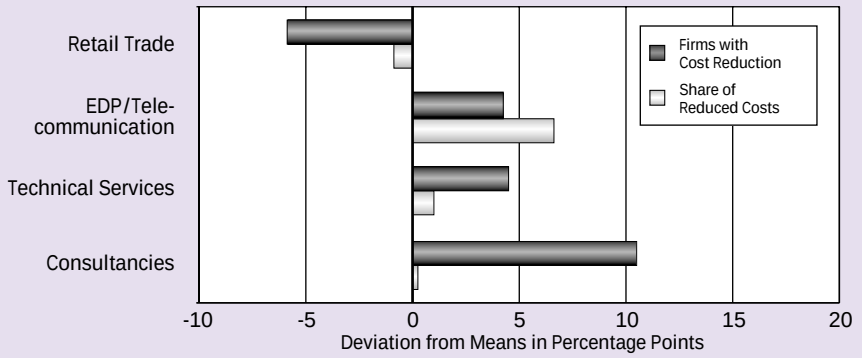
Market Novelties

Market novelties are new or significantly improved services, for which a company is the first provider and introduces them onto the market. The enterprises define which market is relevant to them. Data onto market novelties were collected for the first time for 1998.
Turnover shares due to market novelties refer to the turnover which the respective company attained with market novelties in the last three years. Bank and insurance companies were excluded from the calculation because there is no precise definition of turnover for these sectors comparable to turnover in other sectors.

Shares of Reduced Costs through Process Innovations

Cost-reducing process innovations refer to new or significantly improved methods used in producing or delivering services, which resulted in a reduction in average costs.
Shares of reduced costs refer to costs of the previous year, which were reduced due to cost reducing innovations within the preceding three year period. The shares are weighted with turnovers, and are thus calculated with exclusion of banks and insurance companies.
Data on cost-reducing process innovations and corresponding shares of reduced cost have been gathered for the first time for 1997.

Cost Reduction in Selected Service Branches 1998



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Share of reduced costs not including banking/insurances. Values preliminary. All information projected to the frame population in Germany.

Cost reductions are particularly high among EDP and telecommunications services. Continuous progress in the field of information and communication technology (ICT) will allow further cost reductions. As was the case in the previous year, this sector was able to reduce almost 10% of the costs again. This economic sector thus clearly supersedes the value of manufacturing, which amounted to 6%.

Innovation Activities of Small and Medium-Sized Enterprises

About 343 thousand of the 348 thousand enterprises in the service sector have fewer than 500 employees, i.e. approximately 98.5%. This share virtually remained unchanged over the course of the years. The recorded decline by more than 20 thousand enterprises in services between 1994 and 1998 affects both, small and medium-sized enterprises (SMEs) as well as large enterprises. Especially, trade and transport services encompass a very large number of SMEs. In this sector, 191 thousand out of 192 thousand enterprises belong to this size category.

Whereas in manufacturing the share of innovative SMEs has been steadily increasing for years, innovation activity of SMEs in the service sector dropped significantly. The number of innovators has declined by almost 30 thousand since 1994, i.e. much faster than the overall number of SMEs. Consequently, the share of innovators fell by 4% point to 58% until 1998. In addition, the recorded short-term increase to 63% among the remaining service providers (excluding trade and transport) was not reattained. All in all, however, innovation activities of SMEs are at the same level as the mean value of all company sizes.

Product innovators display a slightly better development. Not only the share but the absolute figure of product innovators, too, experienced a renewed slight increase in 1998. Business-related services (excluding trade and transport) increased their number of product innovators by 10 thousand companies as early as in 1997. With a share of almost 60%, service sector firms were on par with manufacturing in 1997 and 1998. Distribution services made a slight recovery only a year later. In all, the expected trend reversal among the SMEs is being confirmed.

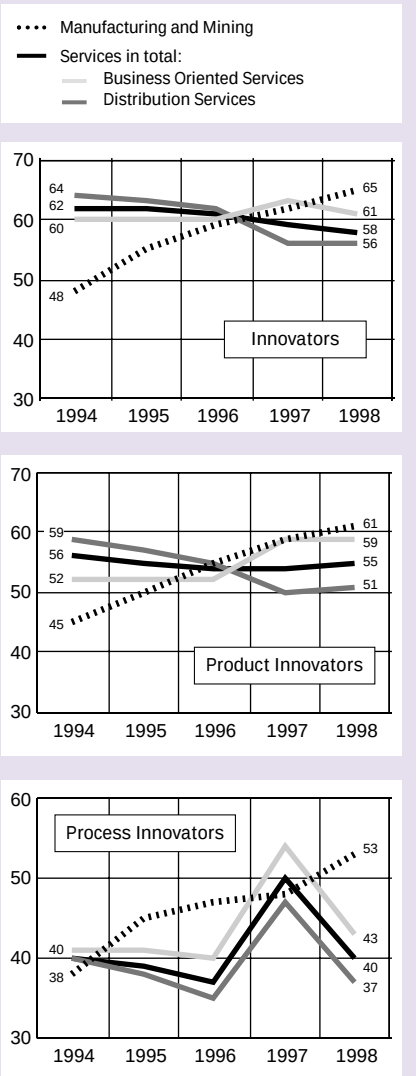
Process innovators implement innovations on a very irregular basis. Approximately 136 thousand SMEs established new or significantly improved processes in their company. The rise in the number of process innovators that was observed in the past year has not continued. In 1998, the share of process innovators still clearly exceeded the 1996 results. Due to the wide fluctuation margin, it is not yet possible to make a general statement on the future development of process innovators.

Even though more than 98% of the companies are categorised as SMEs, they account only for just under 50% of total innovation expenditure in the service sector. SMEs spent approximately 22 billion DM on innovation projects in 1998. That is 3 1/2 billion DM more than in the previous year. The increase of total innovation expenditure in the service sector during the past years is thus considerably supported by the large number of medium-sized service providers. The strong increase compared to the previous year stems mainly from business-related services (excluding trade and transport). SMEs in these economic sectors have raised their innovation expenditure to a total of 13 billion DM. This also compensates for the decline among the distribution services.

SMEs

Small and medium-sized enterprises (SMEs) are enterprises with at least 5 and less than 500 employees.
Because of their relatively high number, small and medium-sized enterprises dominate all shares relating to company figures. Large enterprises dominate, on the other hand, all shares based on amounts in DM, due to their large financial volumes.

Innovation Activities in SMEs 1994 to 1998



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Values not surveyed for 1995 in the Service Sector, values für 1997 and 1998 preliminary. All information projected to the frame population of SMEs in Germany.

The development of business-related service branches strongly resembles the evolution in manufacturing, where the innovation budget was also considerably expanded in 1998. Expenditure projected by enterprises for 1999 confirm the value of 1998: innovation budgets in business-related services provide for similarly high innovation expenditure, whereas budgets in trade and transport tend towards to be cut.

Innovative SMEs tend to spend a larger share of their turnover for innovation activities than large enterprises. In the business-related economic sectors (excluding trade and transport) the turnover share (3%) is one and a half times as large as the mean value across all size classes.

Among SMEs, the differences between the distribution services trade and transport on the one hand, and business-related services (excluding trade and transport) on the other hand, are even more distinct. The share of innovation expenditure in turnover of business-related service branches is clearly above the average of all SMEs. With respect to the amount of these shares as well as their development, these economic sectors are more similar to manufacturing than to distribution services in trade and transport.

SMEs' success with product innovations – measured as turnover share due to new or significantly improved services – dropped notably in 1998. Even though the number of product innovators increased, the turnover share with new or significantly improved services declined sharply among SMEs. The decline is more pronounced among the distribution services (trade and transport).

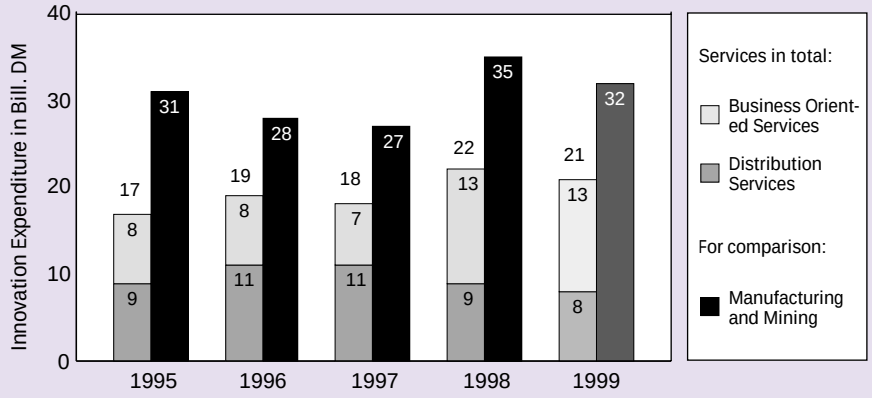
The fact that the turnover share due to new or significantly improved products remained constant across all size classes, is thus mainly attributable to large enterprises. They are more successful on the market with new or significantly improved services.

The share of SMEs with market novelties corresponds to the mean value across all size classes. In business-related services (excluding trade and transport), almost every fourth SME introduces new products, similar to manufacturing.

A more exact analysis reveals that SMEs are more successful with market novelties than large companies. At first sight, both the average share of SMEs with market novelties and the turnover shares generated with those correspond to the mean value across all size classes. However, within the group of SMEs one can observe that market novelties are less likely in parallel with smaller size of the enterprise: the share of companies with market novelties decreases with declining headcount. At the same time, companies introducing such services that are new to the market are all the more successful: the smaller the enterprise, the larger the turnover share due to market novelties. Over all size classes, this results in a ∪-shaped pattern of turnover share.

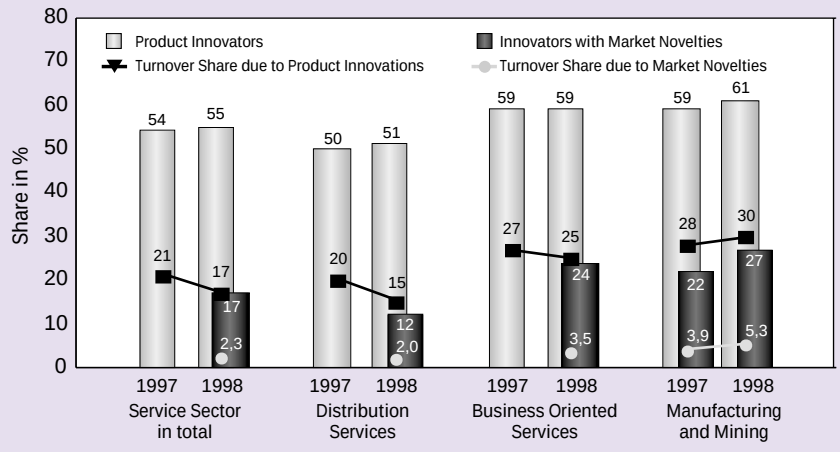
This is due to the fact that micro-enterprises offer a smaller product range than medium-sized or large enterprises: if there is a smaller number of different products on offer, the turnover share of the individual product in the total turnover is large. The comparison with success indicators of

Innovation Expenditure of SMEs 1995 to 1999



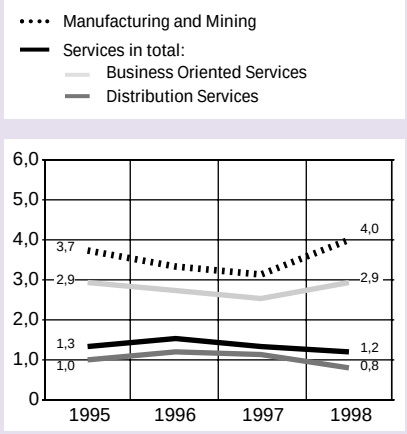
Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Deviation from total due to rounding errors. Values for 1997 and 1998 preliminary. Values for 1999 are plans/expectations of firms. All information projected to the frame population of SMEs in Germany.

Product Innovations in SMEs 1997 to 1998



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Turnover shares not including banking/insurances. Values preliminary. All information projected to the frame population of SMEs in Germany.

Share of Innovation Expenditure in Turnover of SMEs 1995 to 1998 (in %)



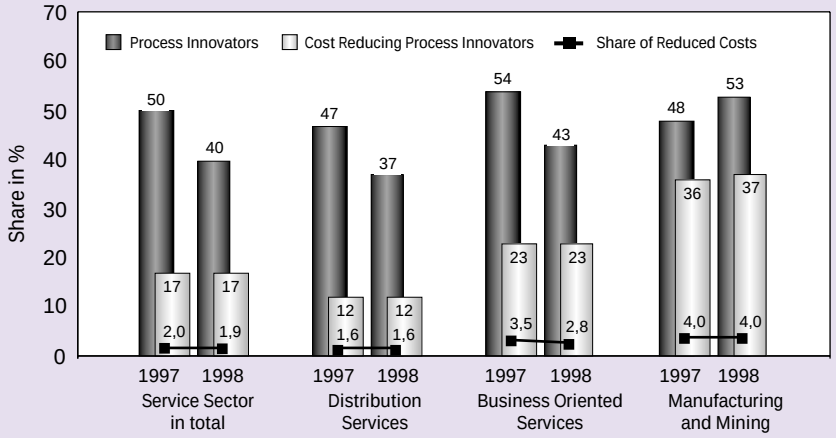
Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Turnover shares not including banking/insurances. Values for 1997 and 1998 preliminary. All information projected to the frame population of SMEs in Germany.

service innovations demonstrates, however, that SMEs do have a relative strength and success regarding market novelties. With new services, which were not new to the market, not only does the frequency of a new service innovation decrease in parallel with the size of the enterprise, the attained turnover share with said product declines as well. Consequently, the turnover share of SMEs attained with new services in 1998 is distinctly below the value of large enterprises. Large enterprises are at an advantage in the diffusion of new technologies and imitation of new services, whereas SMEs demonstrate their relative strength in developing and providing fundamentally new services.

As is the case in the mean value across all size classes, relative importance of cost-reducing process innovations also increased among SMEs. With a declining share of process innovators, their share of cost-reducing process innovations remained constant. On average, approximately 58 thousand SMEs (17%) introduced cost-reducing process innovations. Business-related services (excluding trade and transport) accounted for a significantly larger share, amounting to 23%.

The share of cost-reducing SMEs is thus just as large as in companies with more than 500 employees. However, cost reductions attained with new processes are lower for SMEs than for large enterprises. The difference is particularly marked among the business-related services. The share of cost reductions due to new processes amounts to 2.8% for SMEs. With a cost reduction of 4%, large enterprises clearly achieve higher savings in this field. This means that SMEs in the service sector should be able to increase the success of cost-reducing new processes in SMEs.

Process Innovations in SMEs 1997 to 1998



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Shares not including banking/insurances. Values preliminary. All information projected to the population of SMEs in Germany.

Reference Numbers of Innovation Results – SMEs 1997 to 1998

(Information in %)	1997		1998	
Service Sector in total				
Share of Firms with				
– Product Innovations	54,0		54,7	
Share of Turnover due to Product Novelties		*21,5*		*17,2*
– Market Novelties	–		17,2	
Share of Turnover due to Market Novelties		*–*		*2,3*
– Cost Reduction	16,7		16,8	
Share of Reduced Costs		*2,0*		*1,9*
under them:				
– Distribution Services				
Share of Firms with				
– Product Innovations	49,9		51,4	
Share of Turnover due to Product Novelties		*20,3*		*15,1*
– Market Novelties	–		11,8	
Share of Turnover due to Market Novelties		*–*		*2,0*
– Cost Reduction	11,6		12,2	
Share of Reduced Costs		*1,6*		*1,6*
– Business Oriented Services				
Share of Firms with				
– Product Innovations	59,3		58,8	
Share of Turnover due to Product Novelties		*27,4*		*25,4*
– Market Novelties	–		24,0	
Share of Turnover due to Market Novelties		*–*		*3,5*
– Cost Reduction	23,4		22,6	
Share of Reduced Costs		*3,5*		*2,8*

Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Market Novelties surveyed 1998 for the first time. Turnover shares and shares of reduced costs not including banking/insurances. Values preliminary. All information projected to the frame population of SMEs in Germany.

Innovation Activities in the New Länder

The number of service providers in the new Länder has steadily declined during the whole period under review. In 1998, about 45 thousand companies had their head office in the new Länder, i.e. approximately 7,600 less than in 1994. As is the case in the mean value of the whole of Germany, a stabilisation also began to emerge in the new Länder in 1998. Even in the trade and transport sector, where the

New Länder

In the survey, companies in the new Länder include firms from the federal states in East Germany as well as firms in former West Berlin.

Due to the relatively small amount of cases, statements on large enterprises (500 employees or more) and individual sectors rest on a weak foundation. In addition, company and turnover figures are subject to relatively large fluctuations over the course of time, which makes it difficult to identify general tendencies.

Reference Numbers of Innovation Activity in the Service Sector – SMEs 1994 to 1998

	1994 absolute	1994 *in %*		1995 absolute	1995 *in %*		1996 absolute	1996 *in %*		1997 absolute	1997 *in %*		1998 absolute	1998 *in %*	
Firm Structure (in Thsd.)															
Service Sector in total	365	*100*		363	–		354	*100*		345	*100*		343	*100*	
amongst them:															
Innovators	228	*62*	*100*	–	–	–	215	*61*	*100*	205	*59*	*100*	199	*58*	*100*
Product Innovators	204	*56*	*90*	–	–	–	192	*54*	*89*	186	*54*	*91*	188	*55*	*94*
Process Innovators	148	*40*	*65*	–	–	–	132	*37*	*61*	174	*50*	*85*	136	*40*	*69*
Firms with R&D	40	*11*	*100*	–	–	–	37	*10*	*100*	–	–	–	27	*8*	*100*
Continuous R&D	28	*8*	*69*	–	–	–	19	*5*	*51*	–	–	–	18	*5*	*66*
Occasional R&D	12	*3*	*31*	–	–	–	18	*5*	*49*	–	–	–	9	*3*	*34*
under them:															
DistributionServices	212	*100*		210	–		204	*100*		195	*100*		191	*100*	
amongst them:															
Innovators	136	*64*	*100*	–	–	–	126	*62*	*100*	110	*56*	*100*	106	*56*	*100*
Product Innovators	125	*59*	*91*	–	–	–	113	*55*	*90*	97	*50*	*89*	98	*51*	*92*
Process Innovators	85	*40*	*62*	–	–	–	72	*35*	*57*	93	*47*	*84*	71	*37*	*67*
Firms with R&D	15	*7*	*100*	–	–	–	15	*7*	*100*	–	–	–	9	*5*	*100*
Continuous R&D	9	*4*	*63*	–	–	–	4	*2*	*27*	–	–	–	3	*2*	*35*
Occasional R&D	6	*3*	*37*	–	–	–	11	*5*	*73*	–	–	–	6	*3*	*65*
Business Oriented Services	153	*100*		153	–	–	150	*100*		150	*100*		152	*100*	
amongst them:															
Innovators	92	*60*	*100*	–	–	–	89	*60*	*100*	95	*63*	*100*	92	*61*	*100*
Product Innovators	80	*52*	*87*	–	–	–	79	*52*	*88*	89	*59*	*94*	89	*59*	*97*
Process Innovators	63	*41*	*69*	–	–	–	60	*40*	*67*	81	*54*	*86*	65	*43*	*71*
Firms with R&D	25	*17*	*100*	–	–	–	22	*15*	*100*	–	–	–	18	*12*	*100*
Continuous R&D	19	*12*	*73*	–	–	–	15	*10*	*67*	–	–	–	15	*10*	*82*
Occasional R&D	7	*4*	*27*	–	–	–	7	*5*	*33*	–	–	–	3	*2*	*18*
Innovation Expenditure (in Bill. DM)															
Service Sector in total	–			17,4			18,9			18,3			21,9		
Share of Turnover in %		–			*1,3*			*1,5*			*1,3*			*1,2*	
under them:															
Current Innovation Expenditure	–		–	–		–	–		–	7,4		*41*	9,1		*42*
Capital Innovation Expenditure	–		–	–		–	–		–	10,8		*59*	12,7		*58*
under them:															
Distribution Services		–		9,1			11,0			11,5			8,8		
Share of turnover in %					*1,0*			*1,2*			*1,1*			*0,8*	
under them:															
Current Innovation Expenditure	–		–	–		–	–		–	4,0		*35*	3,1		*35*
Capital Innovation Expenditure	–		–	–		–	–		–	7,4		*65*	5,7		*65*
Business Oriented Expenditure	–			8,4			7,9			6,8			13,1		
Share of Turnover in %		–			*2,9*			*2,7*			*2,5*			*2,9*	
under them:															
Current Innovation Expenditure	–		–	–		–	–		–	3,4		*57*	5,9		*49*
Capital Innovation Expenditure	–		–	–		–	–		–	3,4		*43*	7,0		*51*

Source: ZEW (2000): Mannheim Innovation Panel - Services.
Comments: Deviation from total due to rounding errors. "-": Values not surveyed for that year. Innovation Expenditure for 1994 comparable to following years only to a limited extent. Turnover Shares not including banking/insurances. Values for 1997 and 1998 preliminary. All information projected to the frame population of SMEs in Germany.

number of companies diminished between 1994 and 1997 by 5 thousand or 15%, the number of companies declined only slightly in 1998.

With respect to innovation activities, the new Länder are experiencing a trend reversal. The steep decline in the shares of innovators until 1997 tended to be accompanied by an approximation to the total German average. In 1998, not only the share of innovators rose, the absolute figure of innovators increased slightly for the first time in 1994 as well. More than 26 thousand companies in the new Länder (59%) introduced new services or new processes.

The average of all economic sectors conceals, however, that the share of innovators at the level of economic sectors differs significantly between East and West. The ratio between the less innovative distribution services (trade and transport) and the remaining, rather business-related services (excluding trade and transport), observed in the nation-wide overview, is the very opposite in the new Länder. In the East, enterprises in trade and transport services are distinctly more innovative than companies in business-related economic sectors.

Service providers among business-related services (excluding trade and transport) were able to significantly increase the share of innovators by 3% points to 55% in 1998, compared to last year's trough. Nevertheless, even after this rise in 1998, business-related service providers (excluding trade and transport) are still far less innovative than in the old Län-

der. On the other hand, differences between East and West halved, compared to last year, to approximately 6% points in 1998.

Similar results can be found in the development of product innovations. With regard to product innovators, East German companies that are active in business-related services (excluding trade and transport) are also far below the average of the entire federal territory. With 52%, only slightly more than half of the service providers in this sector introduced new services, in the federal average their share amounted to almost 60%. At least the share of product innovators has been increasing now already for 2 years. In distribution services, the number of product innovators after a sharp decline experienced a slight increase again in 1998. As the number of companies in this sector is still decreasing in the new Länder, this leads to a substantial growth in the share of product innovators.

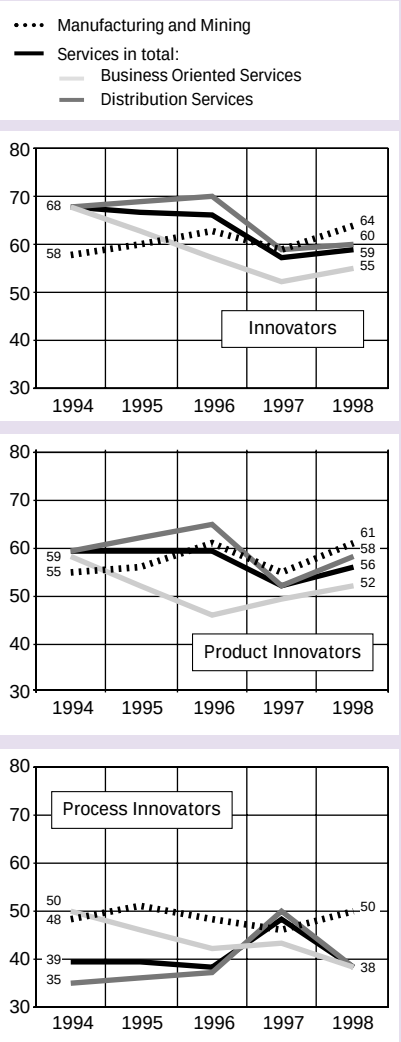
The development of process innovators in the new Länder is comparable to the nation-wide evolution. After relatively high shares in the previous year, slightly more than 17 thousand service providers in the new Länder (38%) introduced new processes in 1998. Their share is thus only slightly below the federal average (40%) in Germany.

What stands out is that the process innovator share in the business-related services (excluding trade and transport) tends to decline over the years. Business-related services in the new Länder are distinctly less innovative than those in the old Länder when it comes to applied processes.

In the new Länder, the share of process innovators declines with an at the same time increasing share of innovators, i.e. the relative importance of process innovations dwindles. However, particularly companies in the business-related service sectors (excluding trade and transport) should also apply more new processes in order to further narrow the gap between technologies used in the old and new Länder.

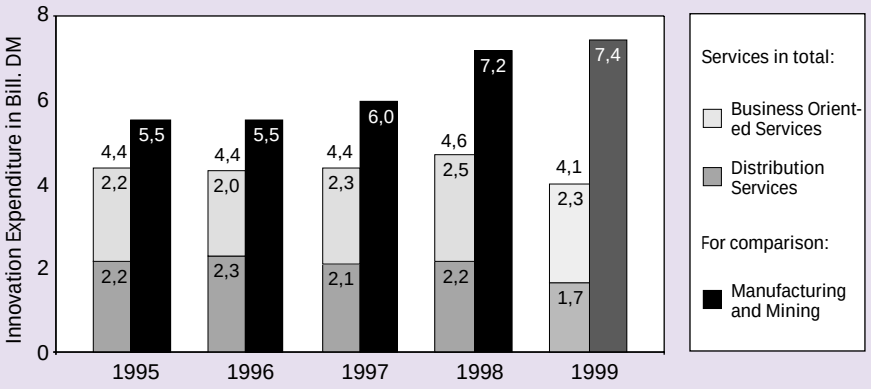
Shares of East German enterprises engaged in R&D roughly correspond to the nation-wide values. In this context, occasional research and development activities prevail. More than 60% of East German research was classified as occasional. This picture emerged as early as in the two past years under investigation. In West Germany the very opposite is true. However, the expected differences between the business-related and distribution services also show up with SMEs. Trade and transport service companies engage

Innovation Activities in the New Länder 1994 to 1998 (in %)



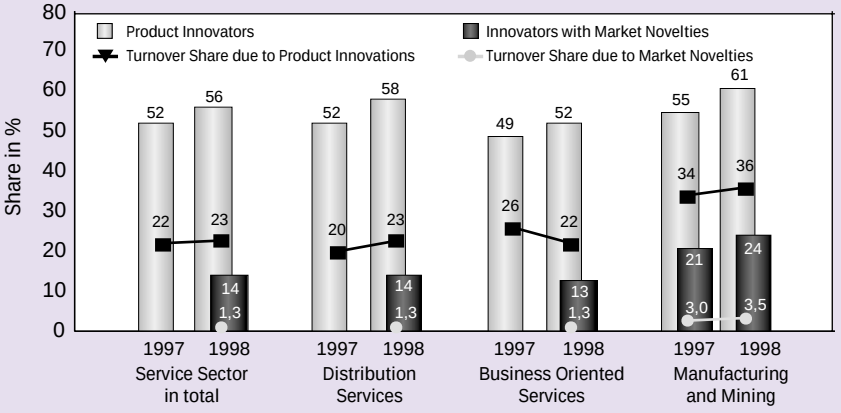
Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Values not surveyed for 1995 in the Service Sector, values für 1997 and 1998 preliminary. All information projected to the frame population in the New Länder.

Innovation Expenditure in the New Länder 1995 to 1999



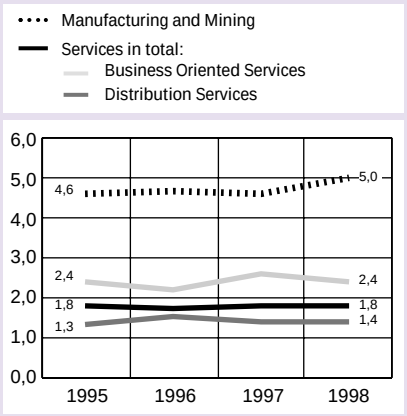
Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Deviation from total due to rounding errors. Values for 1997 and 1998 preliminary. Values for 1999 are plans/expectations of firms. All information projected to the frame population in the New Länder.

Product Innovations in the New Länder 1997 to 1998



Source: ZEW (2000): Mannheim Innovation Panel - Services.
Comments: Turnover shares not including banking/insurances. Values preliminary. All information projected to the frame population in the New Länder.

Share of Innovation Expenditure in Turnover in the New Länder 1995 to 1998 (in %)



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Turnover shares not including banking/insurances. Values for 1997 and 1998 preliminary. All information projected to the frame population in the New Länder.

in R&D only occasionally, whereas business-related service providers conduct R&D continuously in 3 out of 4 cases in 1998. These sectors have thus adapted to the development in West Germany to a much higher degree than trade and transport.

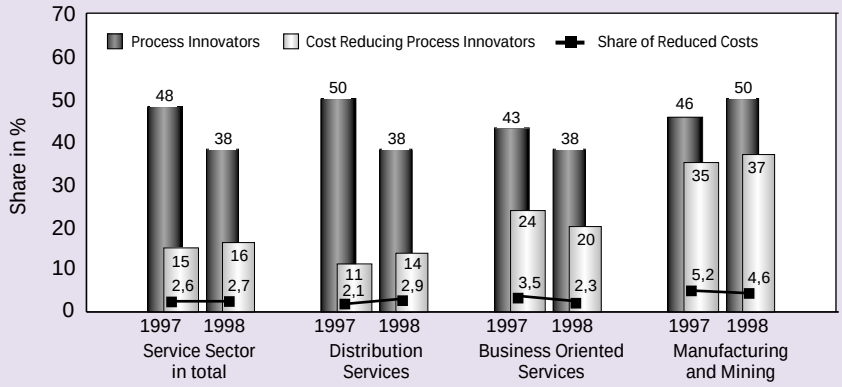
Innovation expenditure increased slightly in the New Länder in 1998. In total, approximately 4,6 billion DM were spent on innovation purposes, which equals a 5% increase versus the previous year. This upswing stems mainly from the other, rather business-related services (excluding trade and transport), which have been expanding their innovation budgets in the past 2 years. While companies in these economic sectors predict similarly high expenditure for 1999 as for last year, distribution service companies drew up a substantially lower budget for their innovation activities. Only time will tell, whether these restrained plans will actually result in a considerable reduction of total innovation expenditure in the new Länder.

The share of innovation expenditure in turnover remained more or less constant in the new Länder between 1995 and 1998. In the new Länder, approximately 18 thousand DM out of 1 million DM turnover are spent on innovation purposes, which is far more than in the old Länder. The same applies to the business-related services (excluding trade and transport). Even though the share of innovators may be lower in these economic sectors, innovators use a larger turnover share to cover the costs of innovation projects.

When evaluating the success with new services, no clear picture emerges for the new Länder. Although the share of product innovators increased considerably in the new Länder in all economic sectors in 1998, success, measured as turnover share generated with these new services, fails to materialise. Despite the higher share of product innovators, an average 23% i.e. just about one fourth of turnover, is generated in the new Länder with new or significantly improved services (as was the case in the last year).

While distribution services were able to raise their turnover share with new services, it decreased significantly by 4 1/2 % points to approximately 22% in business-related services (excluding trade and transport). East German companies in these service sectors are far less successful

Process Innovations in the New Länder 1997 to 1998



Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Shares not including banking/insurances. Values preliminary. All information projected to the frame population in the New Länder.

Reference Numbers of Innovation Results – New Länder 1997 to 1998

(Information in %)	1997		1998	
Services in total				
Share of Firms with				
– Product Innovations	52		56	
Share of Turnover due to Product Novelties		*22,3*		*22,6*
– Market Innovations	–		13,6	
Share of Turnover due to Market Novelties		–		*1,3*
– Cost Reduction	14,8		16,0	
Share of Reduced Costs		*2,6*		*2,7*
under them:				
– Distribution Services				
Share of Firms with				
– Product Innovations	52,4		57,9	
Share of Turnover due to Product Novelties		*20,2*		*22,7*
– Market Innovations	–		13,8	
Share of Turnover due to Market Novelties		–		*1,3*
– Cost Reduction	11,3		14,3	
Share of Reduced Costs		*2,1*		*2,9*
– Business Oriented Services				
Share of Firms with				
– Product Innovations	49,5		52,5	
Share of Turnover due to Product Novelties		*26,0*		*22,5*
– Market Innovations	–		13,1	
Share of Turnover due to Market Novelties		–		*1,3*
– Cost Reduction	23,8		20,3	
Share of Reduced Costs		*3,5*		*2,3*

Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Market Novelties surveyed 1998 for the first time. Turnover shares and shares of reduced costs not including banking/insurances. Values preliminary. All information projected to the frame population in the New Länder.

with product innovations than those in the West. However, one cannot identify a tendency solely on the basis of these two observation dates.

In the new Länder, the share of companies with market novelties (14%) is clearly below the nation-wide average (18%). In manufacturing, too, share of companies with market novelties in the new Länder is 4% points below the nation-wide average. Enterprises in the new Länder are less likely to develop fundamentally new services. Rather, they expand their product range by implementing new technologies and services, which were already introduced by other companies.

As the share of East German service providers with market novelties is below the nation-wide average, turnover share attained with those services is also lower. In the new Länder, the turnover share amounts to roundabout 1.3%, it is thus only half as large as the average percentage of the entire federal territory.

Success of cost-reducing, new processes in the new Länder varies. The share of reduced costs was raised in distribution services. It increased in parallel with the share of companies introducing cost-reducing methods in their enterprises. In addition, the cost reduction share in distribution services (2.8%) is significantly larger in the new Länder than in West Germany (1.7%).

In contrast, efforts to reduce costs in the business-related services (excluding trade and transport) are less successful in the new Länder. The share of enterprises applying cost-reducing processes as well

Reference Numbers of Innovation Activity in the Service Sector – New Länder 1994 to 1998

	1994			1995			1996			1997			1998		
	absolute	*in %*		absolute	*in %*		absolute	*in %*		absolute	*in %*		absolute	*in %*	
Firm Structure (in Thsd.)															
Service Sector in total	52,7	*100*		52,3	–		50,8	*100*		46,3	*100*		45,1	*100*	
amongst those:															
Innovators	35,8	*68*	*100*	–	–	–	33,5	*66*	*100*	26,3	*57*	*100*	26,6	*59*	*100*
Product Innovators	31,1	*59*	*87*	–	–	–	30,1	*59*	*90*	23,9	*52*	*91*	25,4	*56*	*95*
Process Innovators	20,6	*39*	*57*	–	–	–	19,6	*38*	*58*	22,4	*48*	*85*	17,3	*38*	*65*
Firms with R&D	5,2	*10*	*100*	–	–	–	6,7	*13*	*100*	–	–	–	4,1	*9*	*100*
Continuous R&D	2,3	*4*	*45*	–	–	–	2,0	*4*	*30*	–	–	–	1,6	*4*	*39*
Occasional R&D	2,8	*5*	*55*	–	–	–	4,7	*9*	*70*	–	–	–	2,5	*6*	*61*
under them:															
Distribution Services	38,1	*100*		37,1	–		35,4	*100*		33,3	*100*		32,6	*100*	
amongst those:															
Innovators	25,8	*68*	*100*	–	–	–	24,7	*70*	*100*	19,5	*59*	*100*	19,7	*60*	*100*
Product Innovators	22,7	*59*	*88*	–	–	–	22,9	*65*	*93*	17,4	*52*	*89*	18,9	*58*	*96*
Process Innovatots	13,2	*35*	*51*	–	–	–	13,1	*37*	*53*	16,8	*50*	*86*	12,5	*38*	*64*
Firms with R&R	3,1	*8*	*100*	–	–	–	4,6	*13*	*100*	–	–	–	2,6	*8*	*100*
Continuous R&D	0,9	*2*	*30*	–	–	–	0,4	*1*	*10*	–	–	–	0,4	*1*	*17*
Occasional R&D	2,2	*6*	*70*	–	–	–	4,1	*12*	*90*	–	–	–	2,1	*7*	*83*
Business Oriented Services	14,6	*100*		15,2	–	–	15,4	*100*		13,0	*100*		12,5	*100*	
amongst those:															
Innovators	10,0	*68*	*100*	–	–	–	8,8	*57*	*100*	6,7	*52*	*100*	6,9	*55*	*100*
Product Innovators	8,4	*58*	*85*	–	–	–	7,1	*46*	*81*	6,4	*49*	*96*	6,6	*52*	*95*
Process Innovatots	7,3	*50*	*74*	–	–	–	6,4	*42*	*73*	5,6	*43*	*84*	4,8	*38*	*69*
Firms with R&R	2,1	*14*	*100*	–	–	–	2,1	*14*	*100*	–	–	–	1,6	*12*	*100*
Continuous R&D	1,4	*10*	*68*	–	–	–	1,6	*10*	*75*	–	–	–	1,2	*9*	*75*
Occasional R&D	0,7	*5*	*32*	–	–	–	0,5	*4*	*25*	–	–	–	0,4	*3*	*25*
Innovation Expenditure (in Bill. DM)															
Service Sector in total	–			4,4			4,4			4,4			4,6		
Share of Turnover in %		–			*1,8*			*1,7*			*1,8*			*1,8*	
under them:															
Current Innovation Expenditure	–		–	–		–	–		–	2,3		41	1,7		*42*
Capital Innovation Expenditure	–		–	–		–	–		–	2,0		59	2,8		*58*
under them:															
Distribution Services		–		2,2			2,3			2,1			2,2		
Share of Turnover in %					*1,3*			*1,5*			*1,4*			*1,4*	
under them:															
Current Innovation Expenditure	–		–	–		–	–		–	1,0		*35*	0,6		*35*
Capital Innovation Expenditure	–		–	–		–	–		–	1,0		*65*	1,6		*65*
Business Oriented Services	–			2,2			2,0			2,3			2,5		
Share of Turnover in %		–			*2,4*			*2,2*			*2,6*			*2,4*	
under them:															
Current Innovation Expenditure	–		–	–		–	–		–	1,3		*57*	1,1		*49*
Capital Innovation Expenditure	–		–	–		–	–		–	0,9		*43*	1,2		*51*

Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Deviation from total due to rounding errors. "-": Values not surveyed for that year. Innovation Expenditures for 1994 comparable to following years only to a limited extent. Turnover Shares not including banking/insurances. Values for 1997 and 1998 preliminary. All information projected to the frame population of the New Länder.

as the share of the ensuing costs reductions declined in 1998. However, the cost-reduction share experienced a sharper decline, which means that new processes introduced for cost reductions were less successful in 1998. Only companies in EDP and telecommunications services attained a considerably larger share of cost savings (4%) than the average. This success, however, has to be relativised as well: the share of reduced costs in EDP and telecommunications field is not even half as large as in the West, although the share of East German enterprises applying cost-reducing processes in this economic sector equals the share of the West German companies in this branch.

Lack of Qualified Personnel as Factor Hampering Innovation

Despite a continuously high unemployment rate, specially qualified employees are in increasingly great demand in Germany. For one out of seven service providers, i.e. for more than 50 thousand enterprises, shortage of adequately skilled staff hampers innovation activities. In relation to other obstacles, lack of qualified personnel has become even more important in the past years. The comparison with financial obstacles particularly demonstrates this fact.

In 1997, service providers stated high economic risks and lack of appropriate sources of finance by far most frequently as factors hampering innovation. In the meantime, lack of qualified personnel even overtook the lack of appropriate financial resources slightly. So, even if the enterprise has sufficient financial resources, innovation activities are hampered, because no adequately qualified personnel is available.

Particularly the knowledge intensive and innovative sectors are lacking qualified personnel: with 30%, the share of companies affected in EDP and telecommunications services is the highest one. Consequently, innovation projects often cannot be concluded in the projected term. Compared to 1997, the situation in this sector has only slightly improved.

In the field of technical services, the problem has become much worse within two years. One out of four companies in this sector complains about a shortage of qualified personnel; this is a substantial increase by 9% points. In consulting services, the share of affected companies also rose by 5 % points. In the last-mentioned sectors, effects on innovation activities carried most weight. Due to lack of qualified personnel, one out of ten service providers was not even able to start innovation projects; that is twice as many as in 1997.

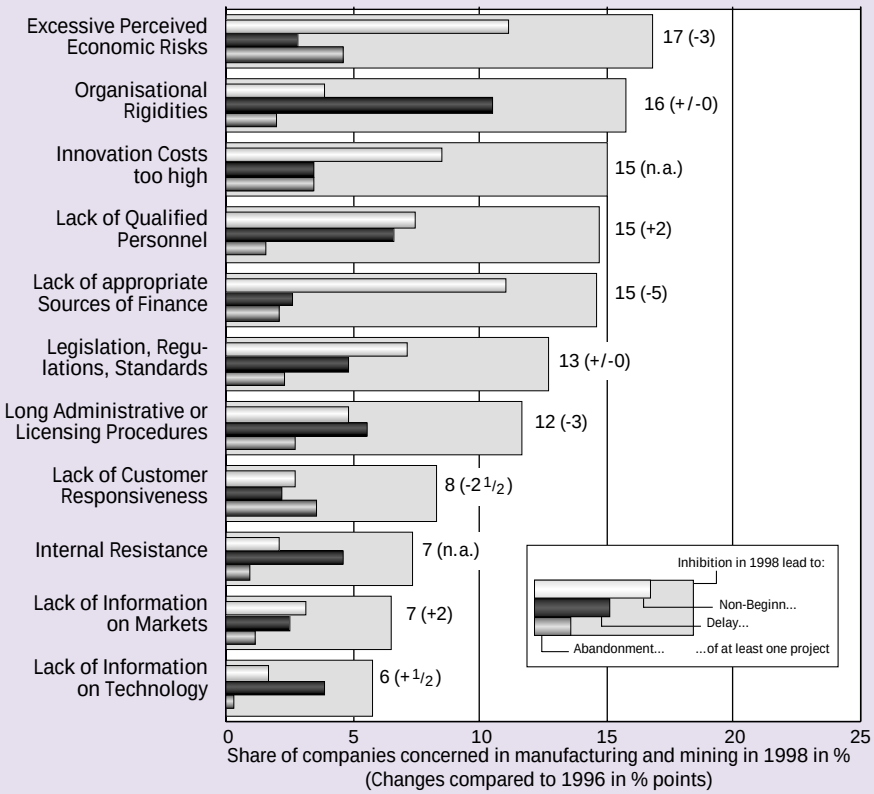
The service providers affected by shortage of adequately qualified personnel are primarily seeking for computer scientists or highly qualified professionals from other EDP-related occupations: this can be seen not only at the economic sector of the most frequently affected service providers: service providers carrying out high investments in information technologies (IT) are six times more often affected by the shortage of qualified personnel than companies making only minor investments in IT. This, in turn, indicates that companies now have the required financial resources for innovations more often than in the past – i.e. they can invest in new technologies – but lack adequately qualified personnel to carry out innovations. Accordingly, services providers with high investments in IT turn out to have a particularly large share of companies, that are not able to start innovation projects, because of a shortage of qualified personnel.

Less knowledge-intensive sectors are also affected by lack of qualified personnel, although to a lesser extent. Distribution service providers may not even start innovation projects for this reason.

At first sight, a seemingly direct correlation emerges between lack of qualified personnel and commitment of a given company to implement further training measures: descriptive statistics suggest that companies spending an above average amount of money for further training measures state lack of adequately qualified personnel far more frequently as a factor hampering innovation. Nevertheless, nothing can be said about effects on the basis of this correlation. Does a shortage in qualified personnel really prompt companies to reinforce further training measures in order to remedy the shortage on their own?

When using multivariate model to analyse this questioning, the hypothesis that the lack of qualified personnel significant-

Importance and Impact of Factors Hampering Innovation in the Service Sector

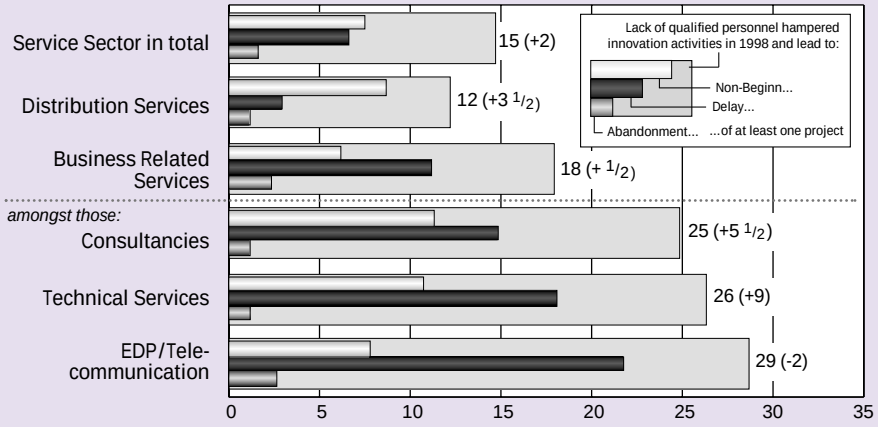


Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: "n.a.": Hampering Factor surveyed 1998 for the first time. Values preliminary. All information projected to the frame population in Germany.

ly influences the amount of further training costs per employee has to be rejected. By applying adequate econometric methods, the influence of, for instance, size, the respective economic sector, or investment in IT, can be controlled; the correlation between shortage of qualified personnel and further training methods turns out to be a spurious correlation. This signifies that the amount of further training expenditure spent per employee in 1998, is independent of the fact, whether the company's innovation activities were hampered by lack of adequately qualified personnel already in 1996 or not. Companies lacking adequately qualified personnel do spend more money on further training; but they have not reinforced their further training as a consequence of lack of qualified personnel.

With respect to lack of qualified personnel with IT expertise, the companies certainly underestimated how quickly new technologies would develop. IT-based processes are becoming increasingly important for intramural service rendering as well as for extramural communication: the presentation in the internet is increasingly regarded as a companies showpiece, and particularly direct networking of companies in the framework of supplier-customer relationship (Business-to-Business, also called B2B) via the Internet is projected to acquire even greater importance in the next years. Companies who want to become more active in these fields, are looking for adequately qualified personnel, who are able to put this into practice as fast as possible.

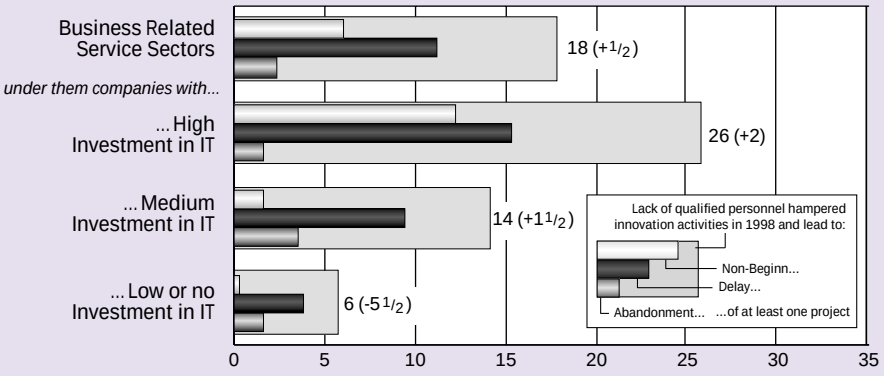
Effects of Lack of Qualified Personnel



Share of companies concerned of the respective sectors in services in 1998 in % (Changes compared to 1996 in % points)

Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: "n.a.": Hampering Factor surveyed 1998 for the first time. Values preliminary. All information projected to the frame population in Germany.

Lack of Qualified Personnel in Business Related Service Sectors



Share of companies concerned of the respective IT investment classes in 1998 in % (Changes compared to 1996 in % points)

Source: ZEW (2000): Mannheim Innovation Panel – Services.
Comments: Values preliminary. All information projected to the frame population in Germany.

However, the implementation of such technologies in companies requires expertise and a different kind of qualification that has not necessarily been, until recently, a typical part of normal professional training. If a company lacks adequately qualified personnel, it will experience severe problems in implementing training or further training measures on its own. It will have to search for such personnel on the market. However, particularly in business-related services, qualification is no longer limited to job-specific knowledge in a narrow sense, but virtually always encompasses the corresponding computer skills.

Within other contexts, companies should be able to alleviate effects of shortage of adequately qualified personnel by engaging more in further training. In the most innovative economic sectors, lack of qualified employees results more frequently in delayed project terms than in the fact that projects are not even started. In such cases, internal further training should be quite promising. In addition, one needs to take into account that the companies' data on further training measures do not include costs for the training of their "own trainees". To examine to which extent the shortage of qualified personnel motivates companies to train qualified personnel that it cannot find on the market, a separate study might be necessary.

Conclusion

The development of innovation activities in the second half of the 90ies reveals considerable differences between individual economic sectors. Whereas innovation activities in distribution services (trade and transport) are declining, a further increase can be detected in other service sectors. In general, the distribution sector is dominating by virtue of its large size, which means that in the whole service sector innovation activities are diminishing.

The most important indicators of the 1999 survey on innovation activities in the service sector are, in short:

- The share and number of innovative service providers has continuously declined between 1994 and 1998. In 1998, approximately 203 thousand companies introduced new or significantly improved processes. Since 1994, this share fell by 5% point to 58%.

▶ However, the development of product innovations indicates a trend reversal in the service sector. In 1998, not only the number, but also the share of companies with new or significantly improved services experienced an increase.

▶ Compared to last year, innovation expenditure in service sectors rose considerably by 9% in 1998 to a total of 43 million DM, despite the declining number of innovators. According to the companies' projections, similar expenditure will be incurred in 1999.

▶ The increase of innovation expenditure is mainly due to the great number of medium-sized enterprises in business-related services (excluding trade and transport). The decline in trade and transport will thus be by far set off.

▶ Innovation success in the service sector also developed in a differentiated way. Companies in business-related service sectors (excluding trade and transport) were able to keep their turnover share generated with product innovations at almost 30%. In this context, EDP and telecommunications companies even exceeded manufacturing with a turnover share of 46%.

▶ Small enterprises in the service sector are at an advantage when developing and selling market novelties. They thus attain a greater turnover share than large companies. The strength of large companies is diffusion and application of new technologies as well as the speedy adoption and integration of new services that were introduced by other companies.

▶ Approximately 60 thousand companies (17%) in the services sector employ new processes to reduce costs. In comparison, cost-reducing processes in manufacturing have a considerably higher importance.

Due to the large heterogeneity of the service sector, problematic areas cannot be immediately identified by applying nation-wide indicators. Results for distribution services trade and transport turned out to be quite critical:

▶ The share of innovative companies in trade and transport has dropped since 1994 from 64% to a mere 56% in 1998.

▶ In these economic sectors, innovation expenditure experienced not only a decline in absolute terms, but also fell in relation to turnover.

▶ Innovation success among distribution services is also comparatively low: turnover share due to service innovations or market novelties, is far below average and not even half as large as in manufacturing.

These developments are mainly determined by companies in the old Länder. In contrast, innovation activities of trade and transport companies in the East reveal a very favourable picture.

With regard to business-related service providers the very opposite is true. West German business-related service providers are innovative above average, have considerably increased innovation expenditure, even when measured against turnover, and their innovation success even surpasses manufacturing in some sectors, whereas the same sectors turn out to be the actual problem children in the innovation landscape of East Germany.

▶ The number of innovators among business-related enterprises in the new Länder increased for the first time in 1998 during the period under review. Nevertheless, the share of innovators is still far below average.

▶ Even after the increases in the past two years, the gap between the product innovator share of these companies and the nation-wide mean value is still extraordinarily wide.

▶ The innovation success that business-related service providers had with new services and market novelties as well as with processes to reduce costs can be regarded as very low.

The reported results reflect the development of innovation activities of German service providers. Apart from these indicators, however, external factors, which cannot always be influenced by the enterprises themselves, are also of importance. Particularly lack of qualified personnel is an increasingly important factor hampering innovation in the service sector.

▶ One out of seven service providers in Germany complains about the lack of qualified personnel. In recent years, the shortage of adequately qualified personnel has become an increasingly crucial factor hampering innovations, and in the meantime restricts innovation activities nearly just as strongly as lack of financial resources.

▶ In business-related service branches, lack of qualified personnel results primarily in delayed project terms; in less innovative economic sectors, innovation projects are not even started.

Lack of qualified personnel does not signify in this context that a service company is lacking a specific number of employees in order to carry out innovation projects. Companies seek especially qualified experts with corresponding professional experience, particularly especially qualified EDP experts or other highly qualified personnel in the field of information and communications technology (ICT).

▶ Companies carrying out high investments in information technology (IT) are by far more often affected by the shortage of qualified personnel than service providers making only minor investments in ICT.

However, software developers are most probably not the only sought-after specialists.

▶ The shortage of adequately qualified personnel is felt not only in the narrow circle of enterprises working in IT services

Population and Projection

The results of the ZEW innovation survey are projected to the stratified population of all service providers in the investigated sectors with a minimum of 5 employees in the Federal Republic of Germany. The differentiation of economic sectors is based on the NACE Classification of Economic Sectors (WZ93 of the Federal Statistical Office). Branches, company size (employees), and region (old and new Länder) serve as stratification characteristics.

Data on population (company and turnover figures) are based on publications of the Federal Statistical Office, publications of federations, and estimations made by ZEW. Employee figures are not available for the population. Data from 1997 and 1998 are partially based on projections of the populations and are thus preliminary.

The data bank of CREDITREFORM serves as a sampling frame. The sample of the year 1999 encompasses approximately 12,000 enterprises, more than 2,400 of which participated actively in the survey. This corresponds to a response rate of about 21%. 2,000 additional companies were interviewed via telephone on core indicators of innovation behaviour, so as to correct any potential bias in the response behaviour of the companies.

The ZEW commissioned infas (Institute for Applied Social Sciences) with the management of the survey's field phase, which was conducted from April until October 1999.

and software sector. In innovative branches of consulting and technical services one out of ten companies does not even start projects due to lack of qualified personnel. In the field of EDP and telecommunications, even three out of 10 companies indicated that lack of qualified personnel hampered innovation.

Conclusions for Innovation Policy

Economic analyses of the service sector are still considerably hindered, as there are no official statistics available for large areas of the investigated economic branches. Thanks to diligent stratification and the participation of more than 2,400 companies in the service sector, the selected sample of the Mannheim Innovation-Panel is indeed representative, and thus reflects the innovation activities in the service sector according to reality. But, when comparing the results to the projection in manufacturing, they rest on a much weaker foundation for the lack of official basic data. The introduction of regular statistics on the service sector would not only expand understanding for the service sector, which is becoming ever more important. With improved base data in the service sector we would be able to give a more precise description of developments in the economy as a whole, and political measures could be better adapted to distinctive features of the service sector.

The overall impression of innovation activities in the service sector is unsatisfactory. Results of the fourth innovation survey reflect the substantial heterogeneity in the service sector. Considerable differences emerge between distribution services (trade and transport) on the one hand, and business-related services on the other hand, as well as between the old and new Länder. Distribution services in the old Länder, and business-related services in the new Länder turn out to be the problematic areas. The observed considerable heterogeneity in the service sector thus reveals the problem to direct universal measures towards those service providers for whom the support was actually intended. An exclusively regionally targeted assistance is not expedient, if it promotes areas which already excel in intensive innovation activities (for instance, enterprises in distribution sectors in the new Länder). On the other hand, assistance based exclusively on economic considerations would neglect regional differences.

In order to reach enterprises in identified economic sectors with measures of research and technology politics, political instruments have to be further adapted to the special circumstances in the service sector. Traditionally, technology and innovation policy was oriented towards the high-tech areas of manufacturing (for instance within the framework of R&D promotion). Apart from the large heterogeneity of this economic sector, the structure of predominantly small business also has to be taken in consideration when implementing political measures in the service sector. In this context, the importance of small businesses for innovation activities in the service sector should not be underestimated. Their importance is reflected in the input side of the development of innovation expenditure, as well as in the innovation success, based on the attained turnover share due to market novelties.

Market success was and still is the best indicator for innovation activities, also in the service sector. The more open and liberalised a market is, the easier application potentials and opportunities can be recognised. When evaluating the innovation capability of the economy, the development of both, input and success, need to be taken into account. Increasing expenditure for innovation projects can be evaluated in a positive way only, if they are also accompanied by a growing innovation success. In manufacturing, the development of turnover shares due to new or significantly improved services, indicates that the innovation success of this industry cannot keep up with the development of innovation input. Similar evidence can also be identified to some extent in the service sector. When developing assistance measures, politics should pay more attention to these market signals.

The economy in the new Länder is still in the midst of the adaptation process to the average level of innovation activities in Germany. Particularly with respect to this adaptation process, the modest success of business-related service providers should be regarded as critical. Despite a rising number of service innovators, the turnover share of service innovations, is experiencing a sharp decline. However, a further approximation to a nation-wide mean value will only be possible, if the adoption and integration of new services is accelerated, even if some of them were already introduced by other companies. This also applies to the introduction of new processes to produce and deliver services.

There is, however, not only need for action in areas, where the development of innovation activities is unsatisfactory. Also in innovative economic sectors, service providers are ever more frequently hampered in their innovation activities by factors which they often cannot influence. In spite of the continuously high unemployment rate, importance of lack of qualified personnel as a factor that is hampering innovation, is increasing and meanwhile has acquired greater weight than lack of financial resources.

However, software developers are most probably not the only sought-after qualified personnel. Economic sectors which are above average affected by this shortage of qualified personnel are particularly users of technologies from the ICT-sector. Apparently, not only software developers are sought-after with regard to the innovation activities in the service sector, but also specially qualified employees, who would be able to apply these new technologies for the company's own innovation activities. Despite the seemingly abundant supply, demand cannot be met. A simple comparison of the number of unemployed information technicians with the number of sought-after IT-specialist does not do justice to reality. As the field of ICT-technologies is so comprehensive, not every unemployed IT-specialist can automatically meet the respective specific requirement of the company. In addition, rapid progress in the ICT-area is responsible for the fact, that, for instance, lack of further education due to long-term unemployment results comparatively fast in devaluation of human capital.

The proposal to give foreign IT-specialists easier access to the German labour market, can compensate shortages on a short-term basis in some cases. Certainly, nobody will have to fear job losses in Germany: companies in the dynamic, booming economic sectors, such as EDP and telecommunications, would not have done without innovation and the corresponding profit up to now, if they would have been able to find adequately qualified experts on the German job market. Quite to the contrary, it is quite likely that innovation projects which have thus become viable will subsequently lead to further job creation.

Apart from these short-term measures, however, it is even more important to ensure on a medium and long-term basis that a well-qualified fresh generation of professionals is also available in Germany. This requires immediate measures, whose effects will begin to show only in several years from now. Today's increasing number of students in computer science courses will have an impact on the labour market only in four to six years, due to normal periods of study in Germany. It is particularly in view of the observed scarcity of adequately qualified personnel that the course contents need to be reviewed as to whether they meet market requirements. By implementing the planned university reform, the scientific environment can be further improved. However, measures concerning educational policy need to start at an even earlier stage and must promote the acquisition of information and communication skills already at schools.

Incentives for enterprises to invest more in in-plant training and further training, could also reduce lack of qualified personnel in specific areas: thorough analyses show that companies which lack adequately qualified personnel indeed have higher expenditure on further training, but did not increase their expenditure after realising lack of qualified personnel as a factor hampering innovation. Particularly the delay of project terms – stated most frequently by companies as a result of shortage of adequately qualified personnel – is likely to be reduced by implementing more further training measures.

In manufacturing as well as in the service sector, qualification becomes increasingly important for competitiveness. For individual persons, higher qualification is linked with higher salaries and less probability of becoming unemployed. For the economy as a whole, with an improved qualification of the working population, the economy also has a better chance to last successfully in the face of technological competition with other nations.

The fact that Germany occupies only a place in the middle, when comparing its investments in the knowledge stock with other industrial nations, is quite worrying in this context. Germany can build on a comparatively high qualification structure of the labour market. Nevertheless, rising investments of other industrial nations in the knowledge stock indicate that other countries have also recognised the growing importance of know-how for competitiveness. Germany's head start over these countries will diminish. For this reason, Germany should not content itself with the preservation of the existing qualification level, rather it should expand it even further. The importance of qualification for innovation activities indicates that declining investments in qualification will impair both future innovation capabilities and competitiveness. ◄

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IMPRESSUM

The Mannheim Innovation Panel – Service Sector
On behalf of the federal ministry of education and research (Bundesministerium für Bildung und Forschung, bmb+f), since 1995 the ZEW in collaboration with infas Institute for Applied Social Sciences and FhG-ISI Fraunhofer Institute for Systems and Innovation Research has been conducting annual surveys on innovation behaviour of the German service Sector.
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