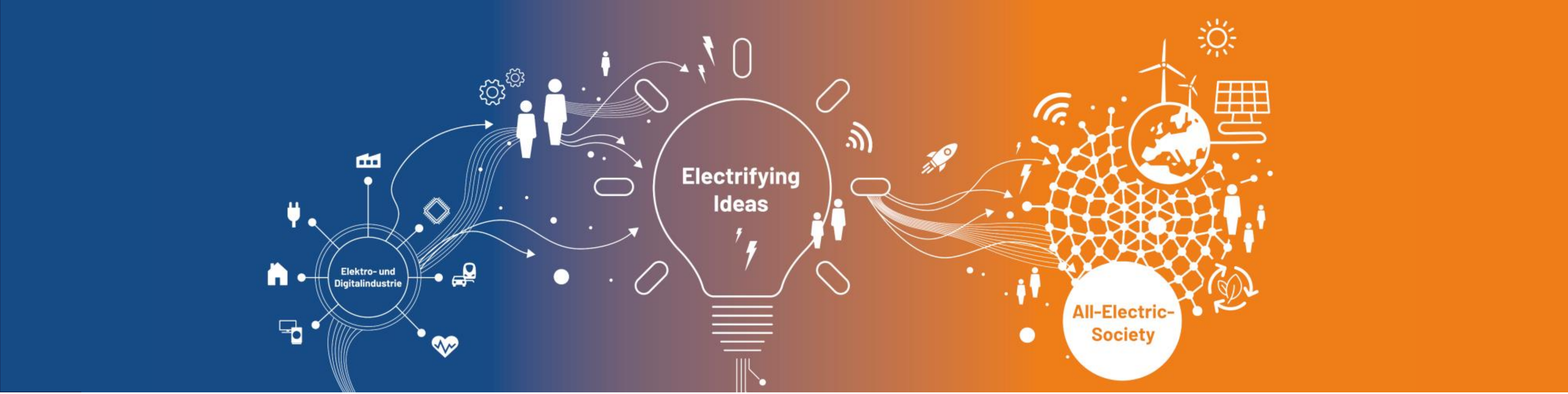

German Electro and Digital Industry – Key Figures on Innovations and Patents

April 2023

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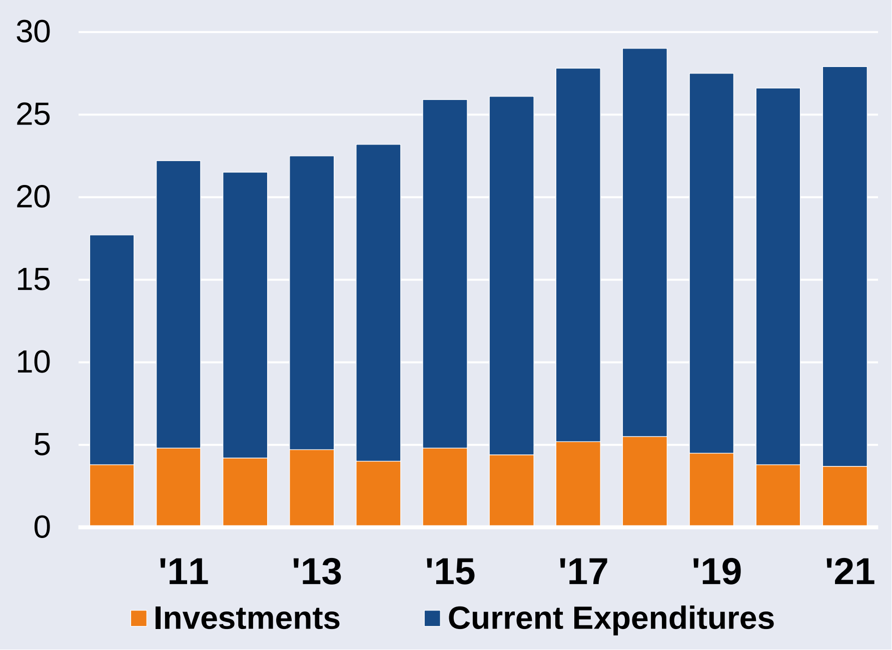
German electro and digital industry
– Innovation expenditures

Innovation expenditures, billion €



Source: ZEW's "German Innovation Survey" and ZVEI's own calculations

The companies of the German electro and digital industry spent a total of €27.9 billion on innovations in 2021. Compared to 2020, the sum was 4.9 percent up. Of the total, €24.2 billion were allocated to current **innovation expenditures** (including payments for wages and materials as well as service contracts with third parties) and €3.7 billion to investments (e.g., equipment, software, industrial property rights).

According to the companies' **planning figures**, the innovation expenditures in the sector are expected to rise from €29.4 billion (+5.4%) in 2022 to €30.3 billion (+3.0) in 2023.

Innovation spendings by all companies in Germany increased by 4.7% to €178.6 billion in 2021. According to plan figures, it will rise to €180.6 billion (+1.1%) in 2022 and then fall to €180.0 billion (-0.3%) in 2023.

German electro and digital industry
– Innovation intensity

Innovation expenditures, share in turnover, %

Source: ZEW's "German Innovation Survey" and ZVEI's own calculations

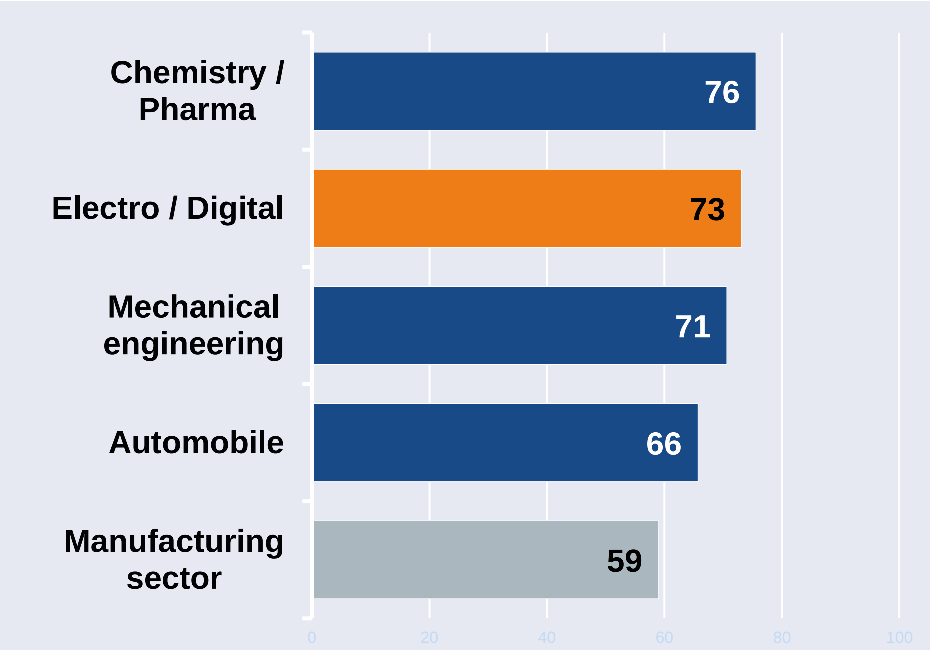
The so-called **innovation intensity** (measured as the share of innovation expenditures in turnover) in the domestic electro and digital industry was 13.9 percent in 2021. That corresponds to a decrease of 0.7 percentage points compared to the previous year, as sales increased comparatively more than innovation expenditures.

This is also one of the key findings of the "**Mannheim Innovation Panel**" of the Centre for European Economic Research (ZEW). The ZEW regularly investigates the innovation behavior of the German economy on behalf of the German Federal Ministry of Education and Research.

45.0 percent of all electro and digital companies conducted research and development (R&D) on a continuous basis. 15.9 percent of the firms focused more on occasional R&D activities. The rest made innovations without conducting any research and development.

German electro and digital industry
– Share of innovators

Share of firms with product or process innovations, 2021, %



Source: ZEW's "German Innovation Survey" and ZVEI's own calculations

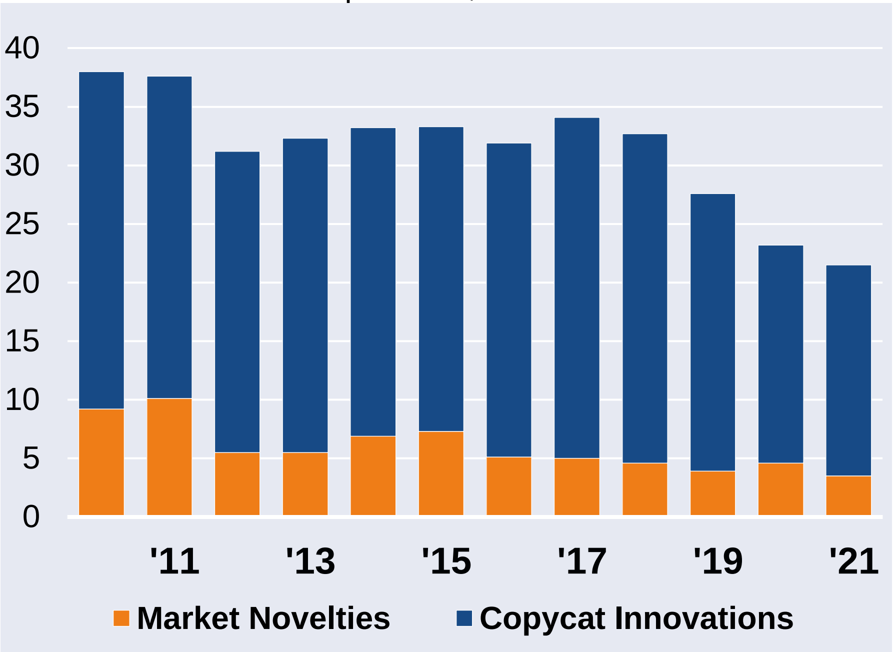
The share of electro and digital companies that have successfully introduced **product and/or process innovations** – and are therefore so-called "innovators" – was at 73.1 percent in 2021.

36.4 percent of the sector's firms have launched both process and product innovations. 25.8 percent implemented only process innovations and 10.9 percent only product innovations.

Nearly 30 percent of the sector's companies have implemented process innovations that have helped **reduce production costs**. Thus, process innovations implemented within the last three years helped bringing down average unit costs by 3.2 percent in 2021.

German electro and digital industry
– Sales with new products

Share of sales with new products, %



Source: ZEW's "German Innovation Survey" and ZVEI's own calculations

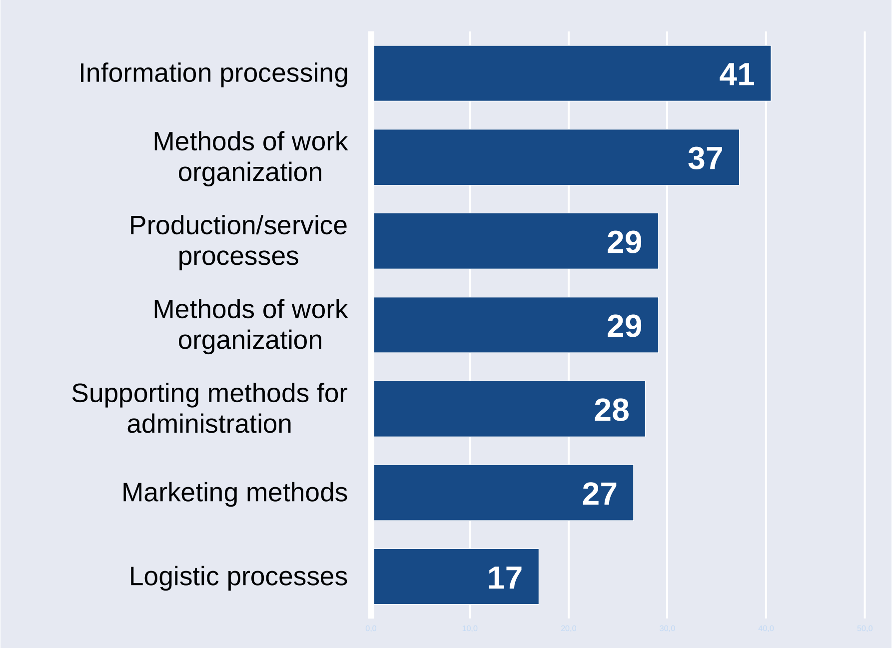
In the German electro and digital industry 21.5 percent of turnover were generated with new products in 2021. **New products** are, thereby, defined as goods that are on the market for less than three years.

A more differentiated view shows that the electro and digital companies generated 3.5 percent of their overall revenues with **market novelties**. At the same time, 18.0 percent of the sales were accounted for so-called **copycat innovations**.

In the total manufacturing sector slightly, more than one-fifth of revenues were generated with product innovations in 2021. Here, the share of sales from market novelties was 5.8 percent, while 15.4 percent of turnover came from copycat innovations.

German electro and digital industry
– Process innovations

Share of types of process innovations, 2021, %



Source: ZEW's "German Innovation Survey" and ZVEI's own calculations

The fact that digitization is likely to be an important driver for the greater spread of streamlining innovations can be corroborated by the **orientation of process innovation activity**.

In 2021, 40.5 percent of companies in the electro and digital industry had process innovations in the area of information processing, i.e. IT hardware, software and data analysis methods. According to the survey, two-thirds of companies with process innovations have introduced **new or improved IT methods**.

Other widespread types of process innovations are methods of work organization (37.3%), production/service methods and methods of organizing business processes (29.1% each).

German electro and digital industry
– Patent applications in Germany

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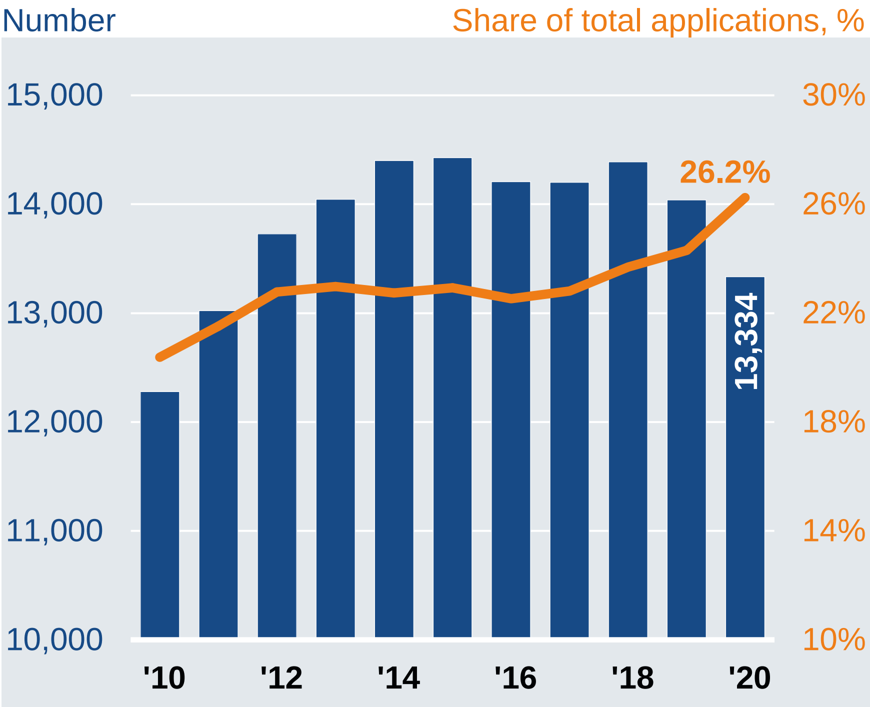


Source: DPMA and ZVEI's own calculations

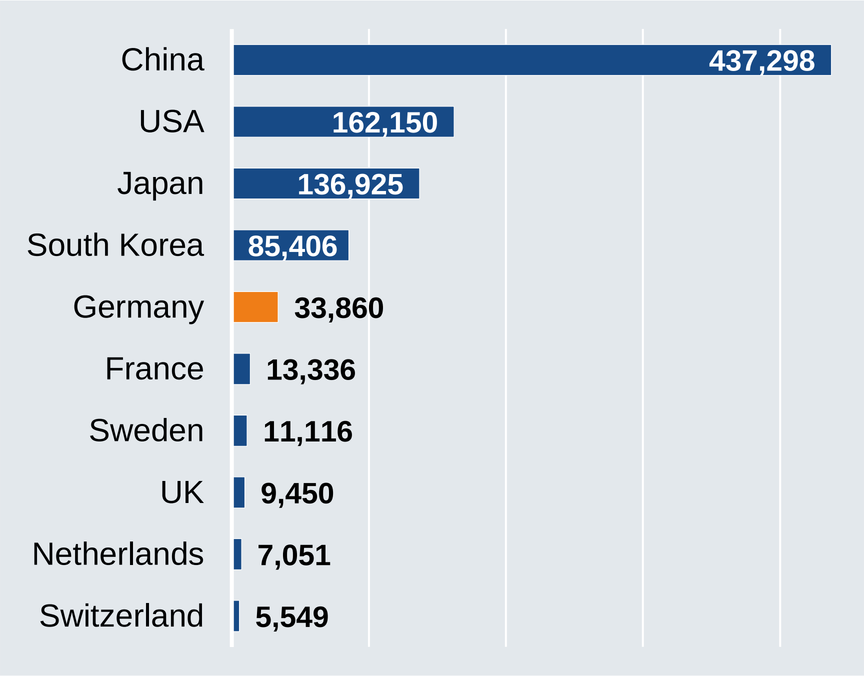
Considering annual patent application is one approach to assess the success of research and development efforts.

With more than 13,000 direct **patent applications** in 2020 the German electro and digital industry once again documented its contribution to technological progress. In comparison to the pre-covid year 2019 the number went down by 5.0 percent. However, the decrease was less significant than in other sectors. Therefore, the share of patents from the electro and digital industry in total patent applications in Germany rose to 26.2 percent.

These figures refer to all patent applications filed directly with the **German Patent and Trade Mark Office** (DPMA) which are published after an examination phase of up to 18 months.

Electro patents worldwide
– Comparing countries

Number, 2020



Source: WIPO and ZVEI’s own calculations

According to the World Intellectual Property Organization (WIPO) the electro and digital industry filed 957,560 (published) patents globally in 2020. With it, the sector stood for 30 percent of all **patent applications worldwide**.

Once again, most of the patents came from **China**. Firms from the People's Republic filed 437,298 patent applications, which were more than those coming from the countries in positions two to six together. The second most patents had their origin in the USA (162,150). Japan (136,925) and South Korea (85,406) followed.

With 33,860 patents **Germany** was ranked 5th in the global patent ranking. France (13,336), Sweden (11,116), UK (9,450), the Netherlands (7,051) and Switzerland (5,549) formed the second half of the top 10 list.

German electro and digital industry
– Innovation figures

	Unit	2017	2018	2019	2020	2021 1)	2022 2)	2023 2)
Innovation expenditures	**Billion €**	**27.8**	**29.0**	**27.5**	**26.6**	**27.9**	**29.4**	**30.3**
Current expenditures	Billion €	22.6	23.6	23.0	22.8	24.2		
Investments	Billion €	5.2	5.4	4.5	3.8	3.7		
Innovation intensity	**%**	**14.5**	**15.0**	**14.5**	**14.6**	**13.9**		
Share of firms with continuous in-house R&D	**%**	**42.3**	**46.9**	**44.1**	**45.2**	**45.0**		
Share of firms with occasional in-house R&D	**%**	**14.9**	**15.4**	**19.1**	**17.7**	**15.9**		
Share of innovators	**%**	**65.2**	**82.1** 3)	**73.4** 4)	**78.7**	**73.1**		
Share of product innovators	%	56.4	65.6 3)	52.8 4)	50.2	47.3		
Share of process innovators	%	36.1	69.8 3)	65.9 4)	66.6	62.2		
Share of firms with market novelties	**%**	**27.0**	**28.3**	**26.8**	**25.3**	**24.1**		
Sales with new products	**%**	**34.1**	**32.7**	**27.6**	**23.3**	**21.5**		
Sales with market novelties	%	5.0	4.6	3.9	4.6	3.5		
Sales with copycat innovations	%	29.1	28.1	23.7	18.7	18.0		
Share of firms with cost reduction owing to process innovations	**%**	**20.0**	**27.9**	**27.3**	**22.8**	**27.6**		
Unit cost reduction owing to process innovations	**%**	**3.5**	**3.5**	**3.4**	**3.2**	**3.2**		

Source: ZEW's „German Innovation Survey“ and ZVEI's own calculations

Notes: 1) provisional, 2) planned, 3) Adjustment to Oslo Manual 4) Adjustment to business register from Destatis

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