



KfW Research

# »»» KfW SME Digitalisation Report 2020

## Digitalisation activity fell before Corona, ambivalent development during the crisis

## **Imprint**

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Small and medium-sized enterprises scaled back their digitalisation efforts in response to the cyclical downturn in the year 2019. Then in 2020, the coronavirus pandemic triggered a surge in digitalisation projects. By January 2021, one in three SMEs (33%) had ramped up their digitalisation activities. This shows how important digitalisation measures are for businesses' acute crisis management. Only 5% of SMEs have reduced their digitalisation efforts. The balance between businesses that reduced and those that stepped up their digitalisation activities in 2020 is hence 28%.

SMEs that have been hit very hard by the crisis but not in an existential way (balance: 36%) and those that expect it to last for an extended period (balance: 31%) were much more active in stepping up their digitalisation efforts than other businesses. Furthermore, 53% of large SMEs with 50 and more employees and 49% of SMEs that conduct research and development (R&D) were particularly likely to increase their digitalisation efforts. The corresponding shares of small businesses with fewer than five employees and SMEs without R&D were 28 and 26%, respectively.

But digitalisation advances are anything but guaranteed. More than one third of SMEs have still not gone digital. Besides, businesses have probably focused on measures that can be quickly put into place and deliver fast results, delaying projects that have a long-term horizon. Another indication that the potential for digitalisation is not being sufficiently harnessed is that the digitalisation of products and services has so far been limited despite a minor increase. Digitalisation measures do not focus

enough on tapping into new markets. Not least, the increases in debt levels resulting from the crisis and companies' desire to become more resilient to crises are likely to exacerbate the trade-off between strengthening resilience to crises and improving competitiveness.

In order to harness growth opportunities and come out of the crisis stronger, economic policy measures now need to set investment incentives that accelerate the transition to a digital economy and make improvements to the business environment. The following approaches could be pursued:

First, businesses must be encouraged to expand digitalisation in a targeted manner. To this end, stronger incentives must be provided in the form of promotional loans, venture capital, credit-like instruments such as grants and tax benefits for R&D. In addition to supporting pioneering enterprises, it is indispensable to promote digitalisation among the mass of latecomer businesses and, in this way, to prevent a split occurring in the SME sector into strongly digitalised, usually large SMEs engaged in R&D and a large mass of companies left behind in the digital transformation.

In addition, it is also necessary to shape the conditions that enable such change: Keywords include the shortage of in-house expertise, a fragmented infrastructure, the financing of initiatives and the dismantling of barriers regarding data protection and data security.

# 1. Introduction

The digital transformation is viewed as an important source of innovation. It influences and drives enterprises' innovation activities in various ways. Thus, digital data represent important input for innovation and digital technologies make it possible to develop innovative products and services, improve efficiency, create new forms of interaction with customers and business partners and accelerate innovation cycles. Digitalisation is often the technological basis that makes innovation possible in the first place.<sup>1</sup> The great importance of digitalisation for innovation activity is illustrated by the fact that 72% of innovative SMEs carry out digitalisation projects at the same time. As a general purpose technology,<sup>2</sup> digitalisation is a beacon of hope for increasing the competitiveness of broad sections of the economy and for kick-starting productivity growth.

Numerous studies have found that, like innovation projects, digitalisation has benefits for the economy and individual businesses alike.<sup>3</sup> Another positive outcome that deserves to be mentioned is that businesses which have expanded in-house digitalisation in the past years can be seen to have a steadier workforce than enterprises that have invested little or nothing in digitalisation.<sup>4</sup> Not least, the current coronavirus pandemic has brought to light the advantages of modern information and communication technologies and digitalised workflows while laying bare existing deficits in Germany.

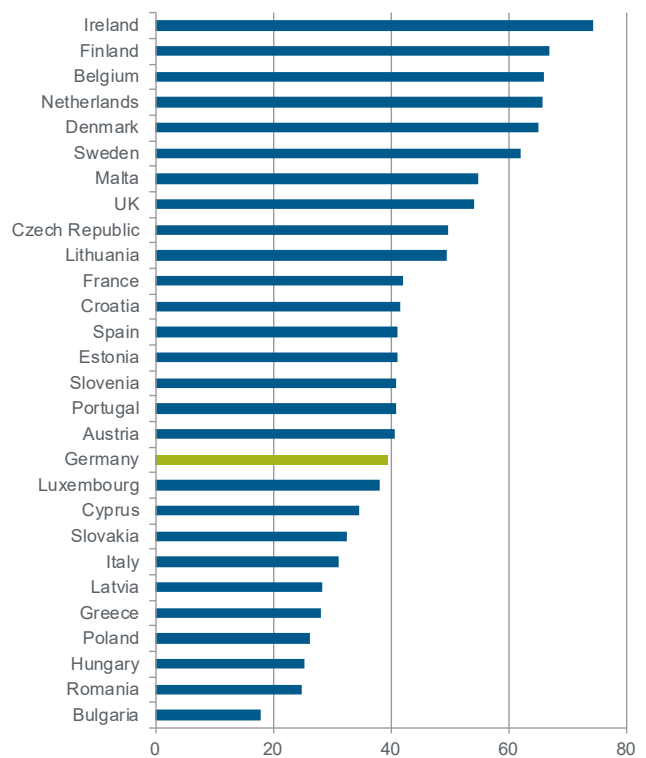
We define digitalisation as the implementation of projects that involve introducing or improving the use of digital technologies in an enterprise's processes, products and services and in its contacts with customers and suppliers. It also includes measures aimed at building corresponding skills within the enterprise and implementing new digital marketing and sales strategies.

The penetration of information technologies into the economy and society is not a new trend.<sup>5</sup> Nevertheless, the current digitalisation wave is a far-reaching process that is generating profound changes in the

economy and society. This is also true because in an international comparison, Germany merely occupies a mid-range position in the current digital transformation. It ranks 12th within the EU 28 on the Digital Economy and Society Index of the European Union (DESI).<sup>6</sup> The country also merely ranks 18th in integrating digital technologies into business processes (Figure 1). According to the *Wirtschaft DIGITAL* economic monitoring report, Germany does not possess any pronounced digitalisation-specific strengths.<sup>7</sup> The report identified a pronounced export weakness in information technologies as a symptomatic consequence.

**Figure 1: Germany's rank in the integration of digital technologies**

In index points



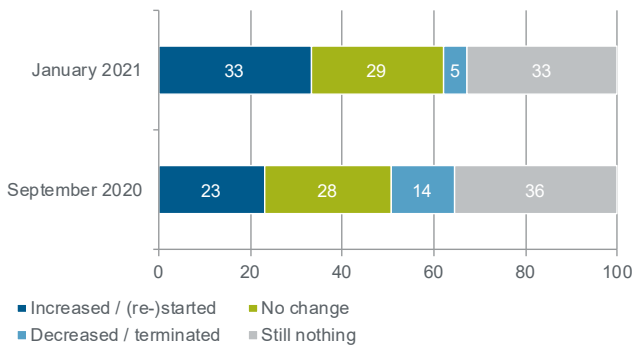
Source: DESI 2020

## 2. Digitalisation activities during the coronavirus crisis

Small and medium-sized enterprises had scaled back their digitalisation efforts in response to the cyclical downturn in the year 2019. But when the coronavirus pandemic started, a surge in digitalisation activity could be observed. Home working capacity was developed and expanded within a short period of time, for example.<sup>8</sup> Online transactions also increased sharply.<sup>9</sup> The use of online trade, cashless payment systems, virtual communication forms and e-health services experienced strong growth. It was crucial for businesses to respond flexibly to declines in demand and supply shortages, to comply with distancing rules and to ensure visibility for customers and cooperation partners, responses to which digitalisation measures were able to contribute significantly, particularly under pandemic conditions.<sup>10</sup>

**Figure 2: Development of digitalisation activities in the course of the coronavirus pandemic**

In per cent



Note: Values extrapolated from the number of employees.

Source: KfW SME Panel 2020, 3rd and 4th supplementary survey, own calculations

In order to examine how digitalisation activity has evolved in the course of the pandemic, KfW Research conducted supplementary surveys under the KfW SME Panel in early September 2020 and at the end of January 2021 (see box 'Supplementary coronavirus surveys' under the KfW SME Panel).

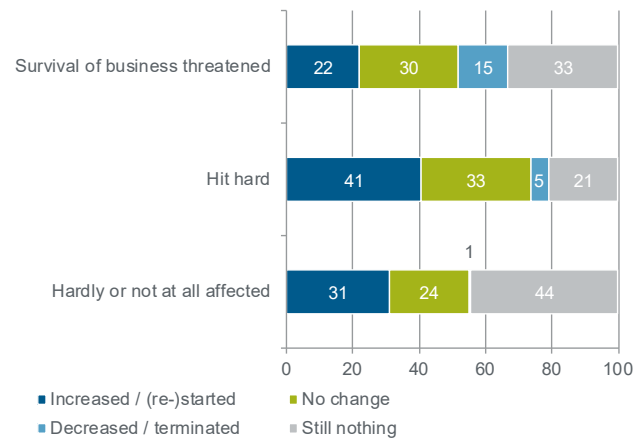
Even as the pandemic continued, more SMEs increased than decreased their digitalisation activities compared with the pre-coronavirus situation. The balance (proportion of enterprises expanding their activities less those reducing them) actually increased to 28% from the autumn 2020 survey to the January 2021 survey (Figure 2). However, an even larger portion of SMEs – 33% – has still not completed any digitalisation projects.

### Second wave of the pandemic drives increase in digitalisation efforts

One likely reason for the increase in digitalisation activity is that the second wave of the pandemic and the associated restrictions have prompted businesses to step up their digitalisation measures once again to manage the crisis. What has enabled them to expand their activities is that although they have taken another hit from the second wave, their business situation is now under less pressure than in the spring of 2020. This applies to the development of turnover in particular.<sup>11</sup>

**Figure 3: Development of digitalisation activities by severity of impact**

In per cent



Note: Values extrapolated from the number of employees.

Source: KfW SME Panel 2020, 4th supplementary survey, own calculations

Thus, enterprises that have been affected significantly by the coronavirus pandemic but not in an existential way have on balance ramped up their digitalisation efforts more often (36%) than businesses that were not or only marginally affected (30%). Those that were affected in an existential way probably refrained from expanding their digitalisation activities because their financial position did not permit them to intensify their efforts (Figure 3).



**Supplementary coronavirus survey to the KfW SME Panel**

The supplementary surveys under the KfW SME Panel were carried out online from 1 to 14 September 2020 and from 12 to 22 January 2021. Among other topics, they addressed the current impact of the coronavirus crisis. All enterprises that participate in the KfW SME Panel and had provided a valid email address were surveyed. As the supplementary survey was linked to the main database of the KfW SME Panel,<sup>12</sup> the survey results can be extrapolated to the total population of SMEs.

The development of digitalisation activities was surveyed as followed:

Does the coronavirus crisis have any effects on your digitalisation activities?

Respondents could choose from the following replies:

- We terminated our digitalisation activities completely,
- We scaled back our digitalisation activities compared with the pre-coronavirus situation,
- We continued our digitalisation activities nearly unchanged from the pre-coronavirus situation,
- We ramped up our digitalisation activities compared with the pre-coronavirus situation,
- We resumed our digitalisation activities in the course of the coronavirus crisis after conducting no digitalisation activities prior to the coronavirus crisis.

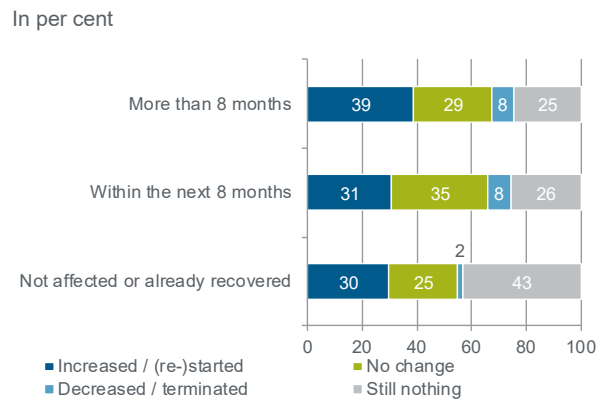
For the analysis, the possible responses ‘terminated completely’ and ‘scaled back’ as well as ‘resumed’ and ‘increased’ were combined for the sake of clarity.

**Anticipated duration of crisis has accelerated digitalisation efforts**

It is also conceivable that more and more companies have recognised the inevitability of having to continue operating under pandemic conditions for an extended period of time and have therefore increased their investment in digitalisation. Businesses that expect the consequences of the coronavirus pandemic to linger for a longer period of time are therefore the ones that are most likely to have expanded their digitalisation activities (39% – Figure 4). To be sure, enterprises in this group have also been among the ones most likely to

reduce their digitalisation activities (8%). On balance, however, the share of businesses that have stepped up digitalisation efforts in this group actually outweighs even more significantly the share of SMEs in the group not affected (anymore) by the coronavirus crisis.

**Figure 4: Development of digitalisation activities depending on how long a business believes it will take for the impact of the pandemic to be overcome**



Note: Values extrapolated from the number of employees.

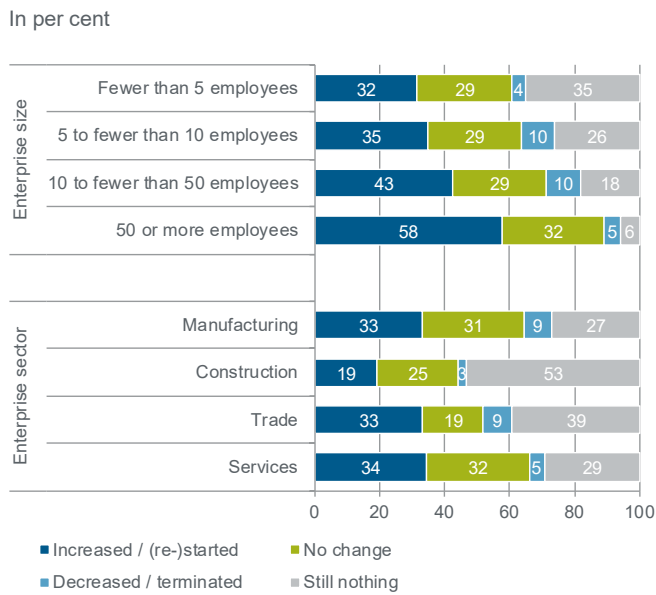
Source: KfW SME Panel 2020, 4th supplementary survey, own calculations

Both findings indicate that the digitalisation measures adopted are measures that are absolutely essential, for example to ensure business operation and generate turnover, can be put in place quickly and are designed to generate an immediate effect. By contrast, it must be feared that strategically oriented, longer-term projects that were not expected to have immediate positive effects were often deferred.

**Large SMEs are often trailblazers, even under coronavirus conditions**

Digitalisation activities have developed in significantly different ways between large and small SMEs, as was the case before the coronavirus pandemic. With increasing company size, the shares of companies expanding their digitalisation activities, in particular, grow while the shares of enterprises scaling back or conducting no digitalisation activities fall (Figure 5). For example, 58% of large SMEs with 50 and more employees have expanded their digitalisation activities, while this is true of only 32% of businesses with fewer than five employees. Besides the reasons previously mentioned, this is probably due to the fact that the impact of the crisis affects small businesses more often in a way that threatens their survival than large SMEs.<sup>13</sup>

**Figure 5: Development of digitalisation activities by enterprise size and sector**



Note: Values extrapolated from the number of employees.

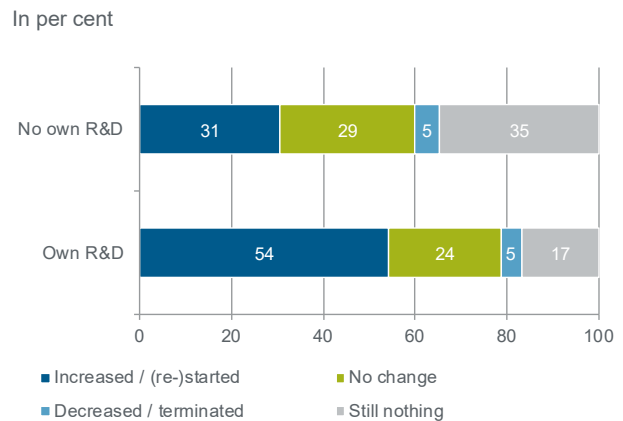
Source: KfW SME Panel 2020, 4th supplementary survey, own calculations

An analysis by sector shows that on balance, service businesses are most likely to expand their digitalisation activities. Businesses operating in sectors involving person-to-person services, such as restaurants, hair-dressers and fitness studios, are hit particularly hard by the current lockdown. Commerce comes in equal second, with retailers feeling the restrictions most of all, as well as manufacturing, although R&D-intensive industries were already leading the charge before the coronavirus hit. The construction sector, which has generally been less active in digitalisation and relatively unaffected by the pandemic, has been the slowest to expand digitalisation activities under coronavirus conditions as well.

**SMEs that conducted own R&D in the past have also been more active during the crisis**

Finally, businesses that conducted own R&D in the past years have been more likely to step up their digitalisation efforts under coronavirus conditions than those with no R&D. At 54%, the share of enterprises that have expanded their digitalisation activities has been around three quarters higher among those with R&D than among those without (Figure 6).

**Figure 6: Development of digitalisation activities by past R&D activity**



Note: Values extrapolated from the number of employees.

Source: KfW SME Panel 2020, 4th supplementary survey, own calculations

This observation also reaffirms the finding from the time preceding the pandemic that businesses with constant processes for developing and introducing innovations – expressed as conducting own R&D – are more likely to continue or even grow such activities than other enterprises, even in a crisis situation. The stronger digitalisation efforts undertaken by these enterprises make them more resilient in acute crises<sup>14</sup> and help them gain ground over rivals with improved competitiveness even after a crisis.

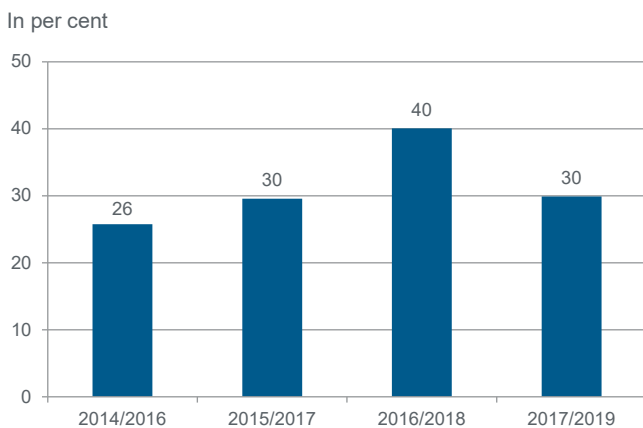


### 3. Completed digitalisation projects before the coronavirus crisis

#### Share of enterprises with digitalisation projects fell before the coronavirus

The share of SMEs that had completed digitalisation projects had increased in each of the past two surveys. That share fell by 10 percentage points in the 2017–2019 period and is now at 30% (Figure 7).<sup>15</sup> This is probably due to the fact that the German economy was already in a downturn in 2019 and accordingly businesses were more cautious.<sup>16</sup> The number of small and medium-sized enterprises with completed digitalisation projects dropped by 380,000 to a good 1.1 million. This finding thus confirms other studies that had identified stagnating digitalisation activities before the coronavirus pandemic.<sup>17</sup>

**Figure 7: SMEs with completed digitalisation projects**



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

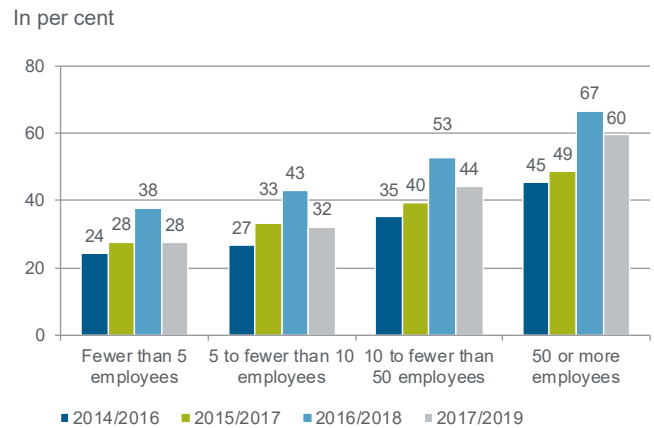
#### Large SMEs are more digitally active

The share of SMEs undertaking digitalisation projects has fallen in all size classes (Figure 8). As before, however, there are significant differences in digitalisation activities between enterprise size classes. The share is 28% among small businesses with fewer than five employees, but more than twice as high (60%) among large SMEs with 50 and more employees.<sup>18</sup>

The percentage of businesses with digitalisation projects rises with enterprise size for a variety of reasons. For example, larger enterprises tend to be more driven to go digital, for example because their broader activities mean they possess more extensive IT infrastructure and are more closely integrated into supra-regional value chains with their corresponding demands. Larger enterprises also tend to have a higher degree of automation. Besides, minimum project sizes and a higher proportion of fixed costs put more pressure on small

businesses<sup>19</sup> and make them more likely to put off digitalisation projects. Finally, smaller enterprises have greater difficulty in accessing external finance for digitalisation projects.<sup>20</sup>

**Figure 8: SMEs with completed digitalisation projects by enterprise size**



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

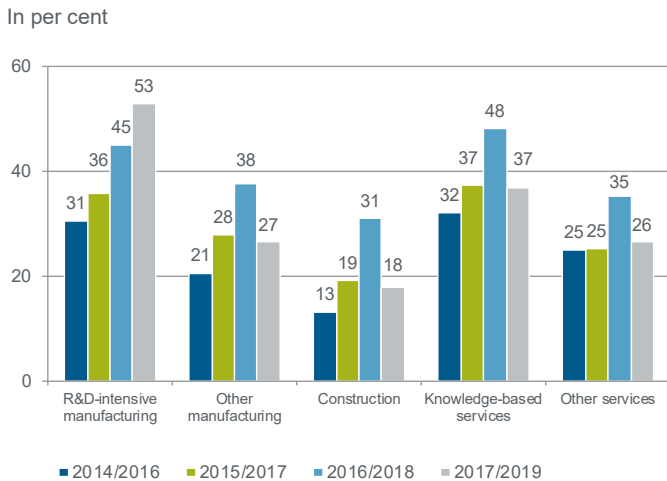
#### R&D-intensive manufacturing and knowledge-based services are in the lead

The sector comparison shows a decline in the share of digital transformers in all sectors except R&D-intensive manufacturing (Figure 9). This sector includes mechanical engineering, electrical engineering and chemicals, for example. Along with businesses from the ‘knowledge-based services’ sector (e.g. media, IT and information services, law firms, tax consultancies and management consulting firms), these two sectors are at the top of the ladder. The share of businesses with digitalisation projects is 53% in R&D-intensive manufacturing and 37% in knowledge-based services. Here, too, there are similarities to innovation activity. Enterprises of these sectors also have the highest share of product and process innovators.

The remaining sectors follow at a considerable distance with shares ranging from 18 to 27%. The shares of SMEs with digitalisation projects in ‘other services’ sectors (e.g. hospitality, transport and storage) and ‘other manufacturing’ (e.g. metal production and processing, garment production or animal feed production) are almost on the same level. The construction sector, in which 18% of companies have completed digitalisation projects, typically exhibits a lower digitalisation potential than other sectors. The direct provision of ser-

vices, in particular, provides limited potential for digitalisation. The use of building information modelling (BIM), however, is regarded as a key step towards digitalisation in the construction sector.

**Figure 9: SMEs with completed digitalisation projects by sector**



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

**Intense competition in supra-regional markets is forcing businesses to go digital**

The regional extent of a company’s sales market also plays an important role in digitalisation. The share of enterprises with digitalisation projects has fallen in all regional dimensions of the sales areas analysed. But the share of digital transformers is twice as high among enterprises that operate in an international sales market than among those with regional activities (Figure 10).

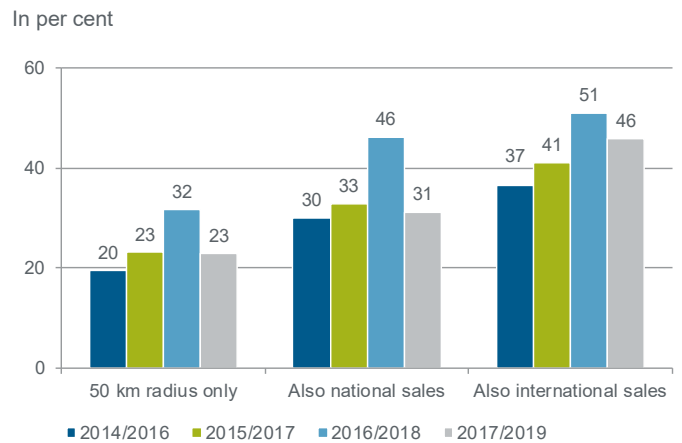
It is known that this correlation also applies to SMEs’ innovation activity.<sup>21</sup> The reason for this is that the relevant enterprises are in closer competition and therefore under particular pressure to keep their products up-to-date and their business processes efficient. Moreover, having a presence in supra-regional and international markets is a source of inspiration and new knowledge<sup>22</sup> that can lead to both traditional innovation and to broader digitalisation. Finally, the use of digital technologies provides great advantages in communicating across long distances, for example.

**Having university graduates in the workforce is an asset for digitalisation**

At present, 45% of enterprises that employ graduates have completed digitalisation projects. That share is nearly twice as high as in businesses that do not employ graduates (Figure 6). The likely reason for this

is that human capital is an important source for generating innovations.<sup>23</sup> This also holds true for digitalisation. An academic education thus provides a major boost to digitalisation. It appears that a completed university degree best enables workers to design and implement such projects.

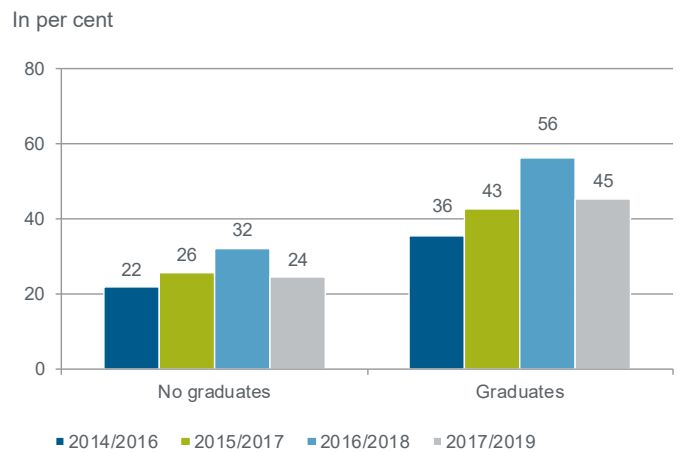
**Figure 10: SMEs with completed digitalisation projects by sales region**



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

**Figure 11: SMEs with completed digitalisation projects with and without graduate employees**



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

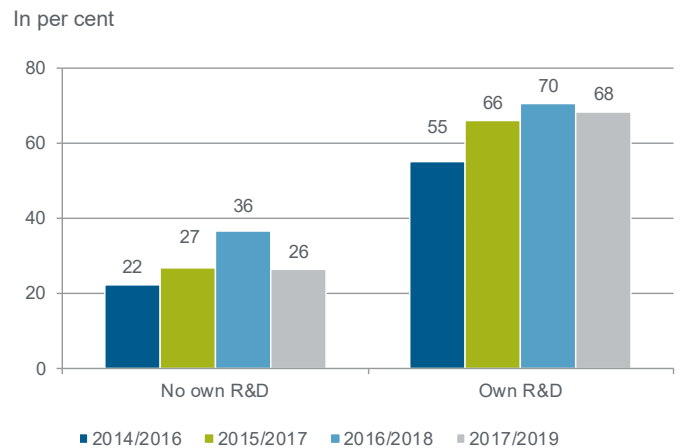
**Enterprises engaged in R&D are more likely to carry out digitalisation projects**

Own research and development (R&D) activities can constitute another source for the design and implementation of digitalisation projects. R&D is defined as ‘systematic creative work aimed at expanding existing knowledge [...] and using it with the objective of finding new potential applications’<sup>24</sup>. It enables a company to develop new digital products and production processes as well as further business applications in the context

of R&D projects. What is also conceivable is that digitalisation ideas in enterprises conducting R&D do not emerge directly from their own research activity. Rather, engaging in own R&D may indicate that the business is operating in an innovative environment and that this also translates to higher digitalisation activities – without meaning that it conducts R&D specifically targeted at digitalisation.

Indeed, enterprises that perform own R&D do implement digitalisation projects more often than enterprises without R&D. At 68%, this share is 2.6 times as high among SMEs conducting R&D as among those who do not (Figure 12). Compared with the previous survey, enterprises that do not conduct R&D have lost ground on those who do. The same phenomenon as for innovations is apparent here, namely that enterprises conducting R&D have constant development and innovation processes in place that also provide more stability for these activities in an economic downturn.

**Figure 12: SMEs with completed digitalisation projects with and without own R&D activities**



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

## 4. Types of digitalisation projects completed

### Digitalising interactions with the business environment continued to top the list before the coronavirus crisis

A closer look at the specific types of projects reveals that the types of digitalisation projects carried out hardly changed in the years before the coronavirus pandemic. SMEs mainly digitalise their interactions within the value chain and with their final customers. Over time, the share of SMEs that have completed projects of this type varies slightly between 52 and 56%, with the current rate sitting at 55% (Figure 13). This often involves redesigning websites and adopting internet applications such as online ordering and payment systems, using social media or setting up customer feedback mechanisms. It likely includes automating and, thus, digitalising the exchange of data within the value chain as well.

The upgrading of IT structures follows closely behind, with 51% of mentions. This includes the installation of new hardware, the implementation of new systems or the adoption of individual, new applications. IT modernisation is therefore the second most common project type. The share of enterprises that carried out digitalisation projects of this type dropped slightly overall across the four observation periods.

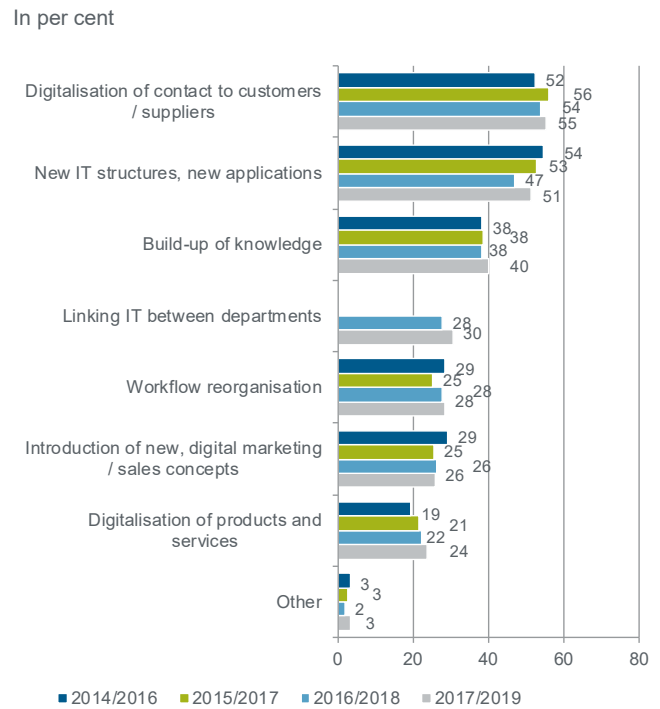
As in the previous period, and with a slightly increased share (40%), projects aimed at boosting digitalisation expertise were the third most common type. They include contracting digitalisation consultancy services and training employees. Lack of in-house expertise is among the most important obstacles to digitalisation.<sup>25</sup> The fact that developing expertise ranks third in the list of digital project types shows that a significant portion of SMEs are actively tackling this obstacle and developing their digital capabilities. Advanced applications, in particular, often cannot be utilised unless an enterprise has the requisite competencies. Improving digital skills therefore plays an important role.

For the second time, the main survey of 2020 enquired about how businesses are digitising links between functional areas as a project type. With a slightly increased share of 30%, projects of this type rank fourth, just slightly ahead of workflow organisation.

Digitalisation measures aimed at reorganising workflows rank fifth, with a currently reported share of 28%. Enterprises need to reorganise workflows when digital transformation profoundly alters existing processes and

business organisation. This indicates that affected enterprises are more likely to undertake complex digitalisation measures.

Figure 13: Types of digitalisation projects



Note: Figures extrapolated to the number of enterprises, for all enterprises with completed digitalisation projects.

Source: KfW SME Panel, own calculations

Introducing new digital marketing and sales strategies ranks sixth, with 26% of mentions. This may take place in the context of digitalising customer interactions, as described previously. It would rather be a sign that digital latecomers are implementing these projects too. However, enterprises that conduct R&D also carry out this type of digitalisation projects particularly often. This suggests that at least some of these projects are also more complex in nature. As was the case with the upgrading of IT infrastructure, the frequency of mentions of this type of digitalisation project also dropped slightly from the 2014–2016 period.

Just as in the previous periods, digitalising products and services ranked last in the survey. What is pleasing is that increasingly more enterprises are addressing the issue. That share rose from 19 to 24% across the four survey waves. Still, the range of services on offer continues to play a relatively minor role in digital transformation efforts. This is consistent with the frequently voiced complaints that digitalisation in Germany focuses too much on efficiency gains<sup>26</sup> and rarely

includes the search for new areas of sales and activity, as well as failing to sufficiently evolve business models.

**Ambitious digitalisation projects are implemented mainly by large SMEs that conduct R&D**

As in the previous period, small businesses were most active in digitalising their interactions with customers and suppliers, taking a share of 56%, as were construction firms (70%) and enterprises that provide other services (63%) – see Figures 14, 15, 16 and 17. This suggests that these enterprises are mostly latecomers. Large SMEs and those that are already more digitally advanced are likely to have completed this step already. The fact that businesses with Germany-wide operations are also in the lead with respect to sales market region does not contradict this. It is likely due to the fact that companies operating regionally are currently even less likely to regard digitalised interaction as relevant to their business because of the shorter distances and that businesses operating internationally are more likely to have completed this step already.

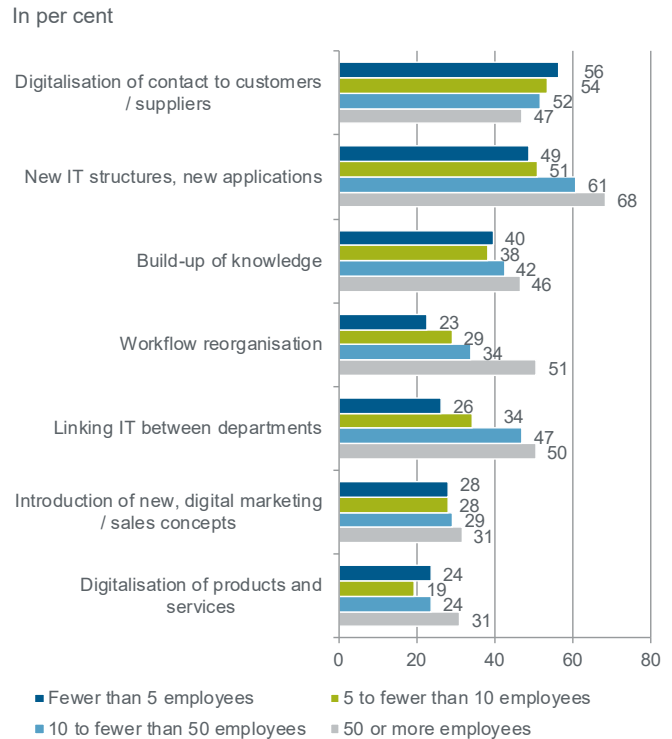
By contrast, larger SMEs focus on upgrading IT infrastructure and introducing new applications (68%). Furthermore, SMEs with 50 and more employees are particularly likely to carry out projects that involve workflow reorganisation (51%) and digitalising links between functional areas (50%).

It is likely that the more widespread renewal of IT infrastructure, introduction of new applications and digital integration of functional areas is partly a size effect because large enterprises are also more likely to have a need to digitalise such activities. Measures aimed at digitalising workflow reorganisation in particular are probably also driven by the fact that these are usually enterprises that are generally more innovative and already more digitalised than others. Such enterprises are also more likely to carry out complex digitalisation projects than others.

**Digital pioneers are upgrading their digitalisation expertise ...**

Developing digital expertise was another measure mentioned more often by large SMEs (46%) than small businesses (38 and 40%). Knowledge-intensive service providers are particularly active in this area, with 44% implementing digitalisation projects. This is consistent with the fact that enterprises with own R&D and companies operating internationally (47% each) also invest more often in expertise than other enterprises. Thus, the relevant enterprises possess characteristics that are typically associated with pioneer companies.

**Figure 14: Types of digitalisation projects by size of enterprise in 2017–2019**



Note: Figures extrapolated to the number of enterprises, for all enterprises with completed digitalisation projects.

Source: KfW SME Panel, own calculations

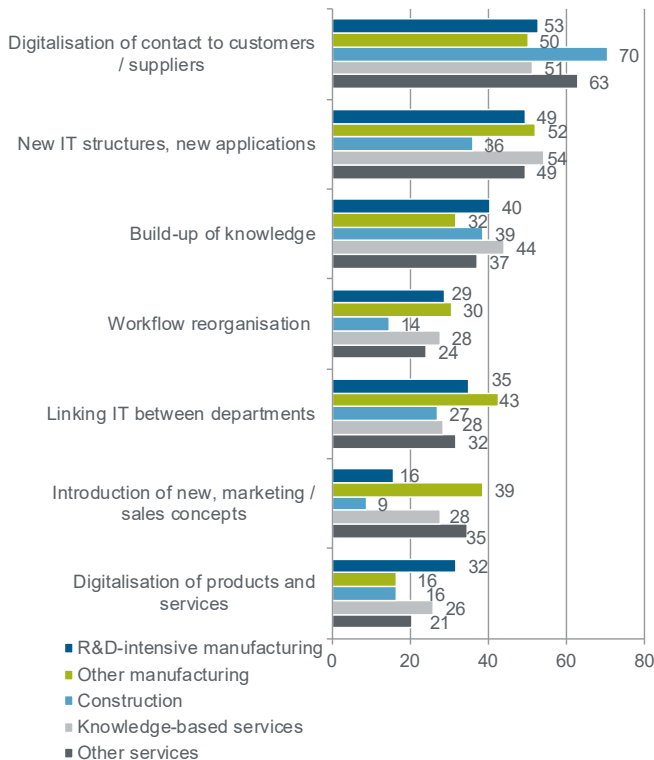
**... and reorganising their workflows as part of digitalisation projects**

With the exception of large SMEs, workflow reorganisation as part of digitalisation projects is more widespread in businesses with supra-regional operations and in those that conduct R&D. This confirms the above consideration that these are more far-reaching projects that are typically more likely to be rolled out by pioneering enterprises.

Projects that involve the digital integration of functional areas are pursued by large businesses that conduct R&D and by manufacturing enterprises. To a large extent, this likely reflects a size effect because only companies larger than a certain size have clearly demarcated functional areas that can be integrated. What may also play a minor role is the way in which an enterprise makes its product and how much innovative capacity it has.

**Figure 15: Types of digitalisation projects by economic sector in 2017–2019**

In per cent



Note: Figures extrapolated to the number of enterprises, for all enterprises with completed digitalisation projects.

Source: KfW SME Panel, own calculations

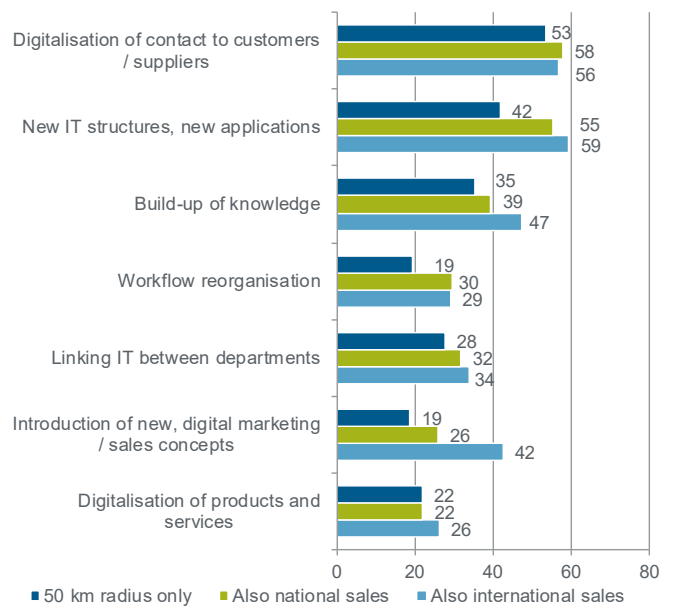
**Small businesses and those that conduct R&D are active in introducing new, digital marketing and sales strategies**

There are only minor differences between businesses of different sizes with regard to the introduction of new digital marketing and sales projects. A wide variation is apparent only in regard to whether an enterprise conducts R&D (49%) and in companies with international operations (42%). As mentioned above, this indicates that there is a broad range of projects of this type carried out by companies that are typically more often among the latecomers but also among pioneering enterprises.

Finally, digitalised products and services were brought to market primarily by large enterprises, those that conduct R&D and those that operate internationally. With respect to sectoral origin, these enterprises are R&D-intensive manufacturers and knowledge-based service providers, meaning they come from sectors that top the list for innovation and digitalisation activity. The digitalisation of products and services is therefore heavily concentrated in pioneering enterprises.

**Figure 16: Types of digitalisation projects by sales region in 2017–2019**

In per cent



Note: Figures extrapolated to the number of enterprises, for all enterprises with completed digitalisation projects.

Source: KfW SME Panel, own calculations

**Figure 17: Types of digitalisation projects of enterprises with and without own R&D activities in 2017–2019**

Shares in per cent



Note: Figures extrapolated to the number of enterprises, for all enterprises with completed digitalisation projects.

Source: KfW SME Panel, own calculations

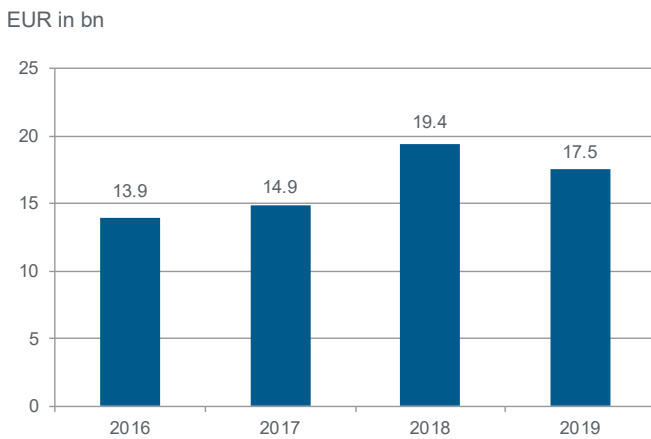


## 5. Development of digitalisation expenditure before the coronavirus crisis

### Digitalisation expenditure was falling slightly before the coronavirus crisis

In 2019, small and medium-sized enterprises spent EUR 17.5 billion on digitalisation projects (Figure 18). The amounts spent on digitalisation also dropped moderately on the previous year, as did the share of businesses with completed digitalisation projects. A comparison with investment expenditure shows that digitalisation expenditure is clearly lower than investment expenditure. SMEs invested EUR 222 billion in assets such as plant, equipment and machinery in 2019.<sup>27</sup>

**Figure 18: Aggregate expenditure on digitalisation in the SME sector**

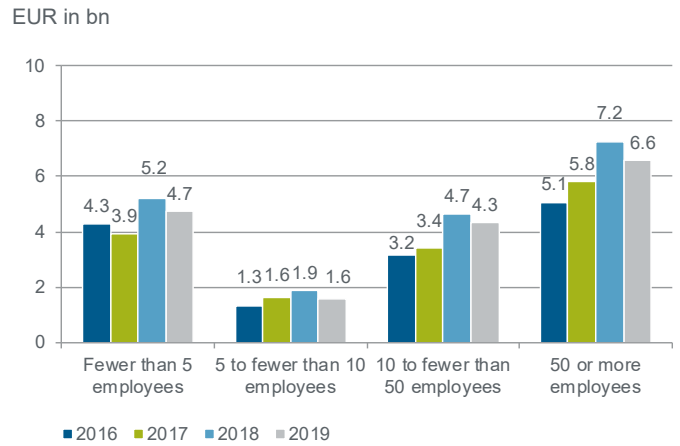


Note: Values extrapolated from the number of employees.

Source: KfW SME Panel, own calculations

Businesses with fewer than five employees took a high share of just under EUR 5 billion or approx. 27% (Figure 19). At first glance, this may come as a surprise because the share of enterprises with digitalisation projects in this group is relatively low. This finding can be attributed to the fact that enterprises with fewer than five employees make up 81%, which is the bulk of small and medium-sized enterprises. Although they represent a small proportion of 2% of small and medium-sized enterprises, large SMEs with 50 and more employees account for the largest share of digitalisation expenditure: just under EUR 7 billion or 38%. The shares of digitalisation expenditure between the individual enterprise size classes have recently remained constant. A slight drop in digitalisation expenditure can be observed in companies of all size classes.

**Figure 19: Aggregate expenditure on digitalisation by SME size**

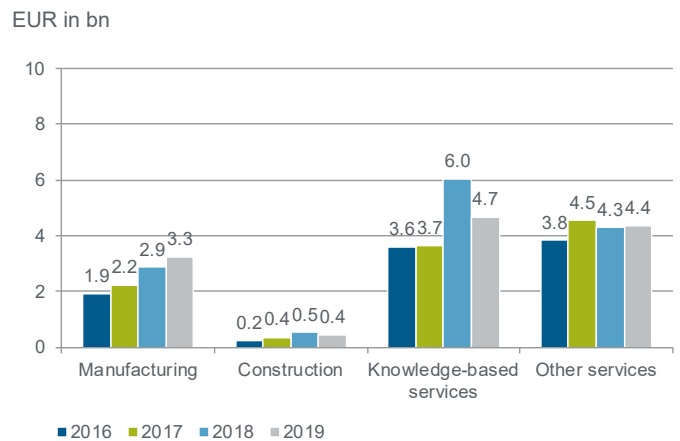


Note: not counting enterprises of the remaining sectors, values extrapolated from the number of employees.

Source: KfW SME Panel, own calculations

A breakdown by economic sector shows that knowledge-based service providers and other service providers have the highest aggregate digitalisation expenditure, at just under EUR 5 billion and a good EUR 4 billion, respectively (Figure 20). Both groups also represent the highest shares of small and medium-sized enterprises. Manufacturing accounts for a good EUR 3 billion in digitalisation expenditure. Construction firms spend the least on digitalisation – less than half a billion euros. The level of expenditure thus also confirms the relatively low level of digitalisation activities of these businesses.

**Figure 20: SMEs' aggregate expenditure on digitalisation by economic sector**



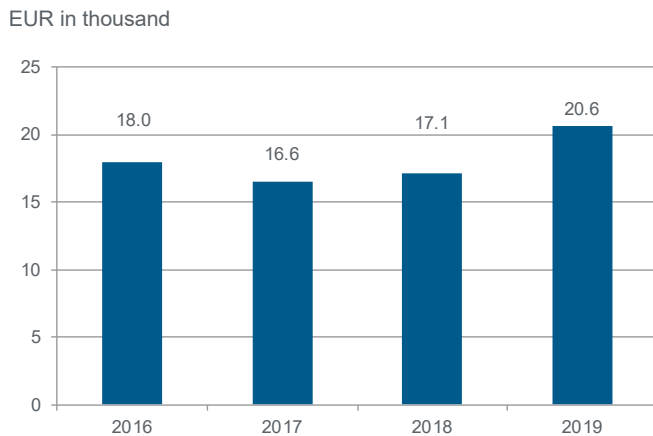
Note: not counting businesses with fewer than five employees, values extrapolated from the number of employees.

Source: KfW SME Panel, own calculations

### Average digitalisation expenditure has risen slightly

In order to examine the concentration of expenditure in different types of enterprises, the following figures illustrate average digitalisation expenditure of SMEs (that invest in digitalisation). SMEs spent an average EUR 21,000 on digitalising their business in 2019. That was a slight increase on the previous years (Figure 21).

**Figure 21: Average expenditure on digitalisation in the SME sector**



Note: Values extrapolated from the number of employees.

Source: KfW SME Panel, own calculations

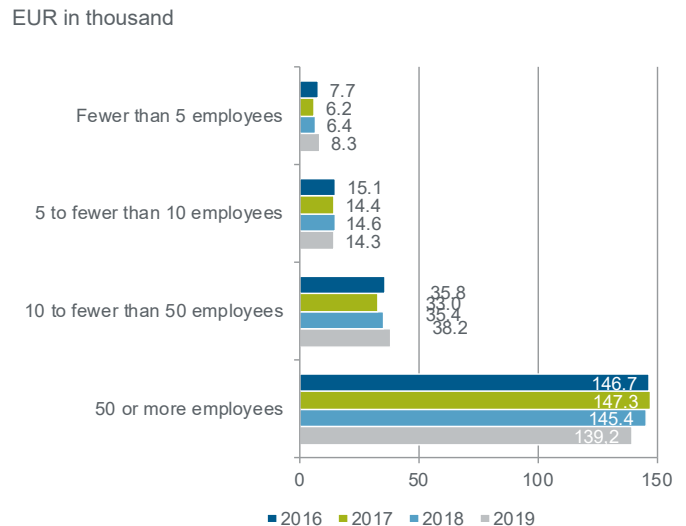
The level of expenditure depends heavily on enterprise size. Businesses with fewer than five employees spent a good EUR 8,000 on digitalisation on average in 2019. This sum rises almost exponentially to EUR 139,000 in enterprises with 50 and more employees (Figure 22). Even though small businesses' average expenditure rose slightly on the previous year while that of large SMEs dropped, this means that large SMEs spend around 17 times more on digitalisation than small businesses.

A comparison by enterprise size must generally take into account that, because of their size, small businesses also need to invest only small amounts in digital transformation in absolute terms. One reason is that they have less hardware and software. However, in relation to annual turnover, small businesses invest above-average amounts in digitalisation relative to their size, so digitalisation places a heavier cost burden on them than on large enterprises.<sup>28</sup>

In a sector comparison, manufacturing enterprises spend the most – just under EUR 60,000. They are followed at a significant distance by companies providing other services and knowledge-based services, which were almost on a par at EUR 20,000 and EUR 16,000. The construction sector is in 4th position with just under

EUR 12,000. Compared with the previous year, average expenditure on digitalisation has grown in all economic sectors under review.

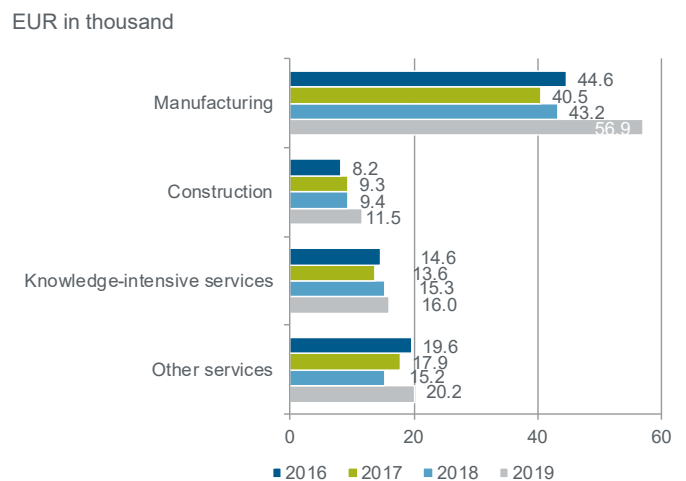
**Figure 22: Average expenditure on digitalisation by SME size**



Note: not counting enterprises of the remaining sectors, values extrapolated from the number of employees.

Source: KfW SME Panel, own calculations

**Figure 23: SMEs' average expenditure on digitalisation by economic sector**



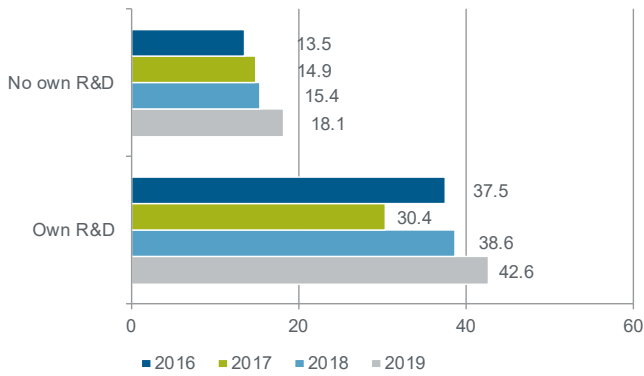
Note: Values extrapolated from the number of employees.

Source: KfW SME Panel, own calculations

The likely main reason manufacturers spend so much on digitalisation is that digitalising production processes is very costly as it often involves replacing or retrofitting machines and equipment. In service enterprises, on the other hand, the processes of service delivery are often not so capital-intensive. Changes are easier to make here. In the construction sector, too, digitalisation activities often focus on administrative processes and less often on the direct provision of services. For this reason they are also likely to be less capital intensive.

**Figure 24: Average digitalisation expenditure of SMEs with and without R&D activity**

EUR in thousand



Note: Values extrapolated from the number of employees.

Source: KfW SME Panel, own calculations

Finally, not only are SMEs without own R&D activities more likely to carry out more digitalisation projects and more ambitious ones; they also spend more on digitalisation on average. In 2019 that was just under EUR 43,000 on average, 2.4 times as much as enterprises without own R&D activities. This discrepancy gives rise to concerns that a gap will open up in the medium term between heavily digitalised, usually large enterprises with R&D activities and enterprises without own R&D that are also lagging behind in digitalisation.

## 6. Conclusion

In response to the cyclical downturn of 2019, small and medium-size enterprises initially scaled back their digitalisation efforts. This resulted in a drop in the share of enterprises with completed projects as well as a decrease in aggregate digitalisation expenditure. With regard to the structure of digital transformers, familiar findings emerge: Large SMEs are more likely to tackle digitalisation projects and spend more on digitalisation on average than small businesses. The same applies to enterprises that conduct R&D which, like large SMEs, are also more likely to be among the pioneering enterprises with regard to the types of projects completed.

Unlike in the case of innovations, more small and medium-sized enterprises increased than reduced their digitalisation activities (balance: 28%) in the course of the pandemic. This is probably due to the fact that digitalisation measures are an important form of acute crisis management. Evidence of this is that particularly enterprises that have been severely affected by the crisis and expect it to drag on for a long time have been more likely to step up digitalisation efforts than those that have been affected minimally or not at all.

But digitalisation during the coronavirus pandemic is not a matter of course. More than one third of SMEs have still not gone digital. What is more, digitalisation efforts may slow if the crisis drags on for longer and the financial situation of businesses deteriorates significantly. Their emphasis on measures that can be implemented quickly and deliver fast results has probably caused more strategically oriented projects with a long-term horizon to be delayed. Finally, the pandemic will likely further widen the divide between small businesses on the one hand and large SMEs as well as SMEs with own R&D on the other hand.

From an overarching perspective, digitalisation is also having a secondary effect during the coronavirus pandemic: Not only is it helping to cushion the negative impacts of the crisis in the short term. It is also accelerating the structural change that is coming anyway.

With the crisis now expected to improve in the further course of the year, businesses will therefore have to keep up the momentum of their digitalisation efforts and go beyond remote working arrangements and video conferencing as new achievements. The next step will have to be to address strategic digitalisation projects and to secure and continue developing the

qualities that have proven to be beneficial during the crisis in the long term, such as flexibility, initiative and entrepreneurial spirit.

For many enterprises, this is likely to be a challenge. For one thing, the tense liquidity situation and debt levels that have risen in the course of the crisis will hamper the implementation of such projects when the crisis is over. For another, the pandemic has probably made many businesses eager to become more resilient to crises. That could make it even more difficult for businesses to choose between building their crisis resilience and improving their competitiveness.

In order to alleviate this trade-off and harness growth opportunities with the aid of digitalisation and come out of the crisis stronger, investment incentives that accelerate the transformation to a digital economy must now be provided and the business environment must be improved. Five starting points for economic policy are conceivable:

First, businesses must be encouraged to expand digitalisation in a targeted manner. Relevant steering mechanisms include promotional loans, exemption from liability and interest rate reductions, for example. This would allow the incentive effect to be adjusted in the short term as well. Strengthening the combination of promotional loans and grants should also be considered. Given the increased corporate debt levels, it should also be examined whether the development of new financing instruments that do not add to companies' debt levels, such as leasing or mezzanine capital, could be a starting point.

In order to step up the implementation of radical innovations in Germany, it will be necessary in particular to meet the high requirements for growth capital in the context of the VC ecosystem. This will require mobilising additional private capital and further strengthening the VC ecosystem. Explicit research projects will have to be supported with grants and tax incentives because their success is uncertain and because they are often heavily focused on basic research. SMEs that conduct R&D have particularly ambitious digitalisation projects.<sup>29</sup> They are digital pioneers and have stepped up their digitalisation projects even during the crisis. Therefore, incentives for conducting R&D must also be increased for small and medium-sized enterprises with the aim of advancing digitalisation. Besides expanding direct support for R&D projects, an important starting

point is to enhance support for small and medium-sized enterprises through tax incentives for R&D, which the Federal Government's Expert Commission on Research and Innovation has also called for<sup>30</sup>.

In general, promotional policy needs to maintain a balance between incentives for investment in fixed assets on the one hand and investment in immaterial assets on the other hand.<sup>31</sup> In order to achieve macroeconomically measurable results, economic policy must ensure that digitalisation spreads across the breadth of the economy.<sup>32</sup> In addition to supporting pioneering enterprises it is therefore indispensable to provide incentives for digitalisation to the mass of latecomer businesses and, in this way, to prevent the SME sector from splitting up into two groups – strongly digitalised, usually large SMEs engaged in R&D and a large mass of companies left behind in the digital transformation. To this end, it will also be necessary to make businesses aware of the benefits and opportunities offered by digitalisation beyond the current phase of crisis management.<sup>33</sup>

Furthermore, it is also necessary to improve the conditions that enable change. A shortage of skilled labour and IT expertise is hampering the digitalisation activities of many businesses.<sup>34</sup> Basic and advanced training will therefore require greater effort as well. Moreover, the infrastructure required in Germany for digitalisation remains patchy. The supply of fast, uninterrupted internet connectivity must be accelerated. Coverage is still particularly problematic in rural areas. The same applies to mobile telephone services.

As a number of digital markets are already in the hands of large technology groups, new competitors often find it difficult to enter them. Public sector initiatives such as GAIA-X are therefore necessary to make markets still in the process of forming contestable for German and European enterprises. Data protection/data security is also a barrier to digitalisation. Many companies have already fallen victim to cybercrime.<sup>35</sup> In addition to building the expertise that enables them to protect themselves and act in a data protection compliant manner, however, a European dimension also needs to be taken into account here. Digital markets in Europe are heavily fragmented. That makes it difficult for businesses to act Europe-wide and thus reach a critical size to be competitive in global markets. This partly explains why dominant tech corporations come from the US and, increasingly, China.

### Structure of SMEs with completed digitalisation projects in 2017/2019

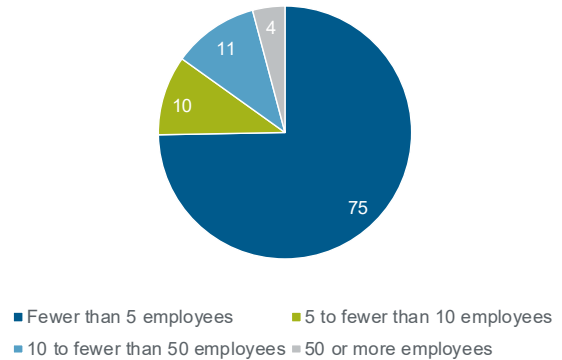
The SME sector, according to KfW’s definition, covers all enterprises in Germany whose annual turnover does not exceed EUR 500 million. By this definition, around 3.79 million SMEs exist in Germany. The SME sector thus accounts for 99.95% of all enterprises. A good 1.1 million of these enterprises have successfully completed digitalisation projects.

Most SMEs with completed digitalisation projects are small businesses. The majority of SMEs with digitalisation projects – a good 800,000 enterprises, or 75% – have fewer than five employees. This high percentage is due to the overall structure of the small and medium-sized enterprise sector. Eighty-one per cent of SMEs have fewer than five employees. Around 7% of enterprises with digitalisation projects are manufacturers and 86% are service providers.

Eighty-two per cent of SMEs with completed digitalisation projects do not conduct any R&D of their own. A mere 9 and 8%, respectively, have conducted own R&D activities continuously or occasionally in the past three years.

**Figure 25: SMEs with completed digitalisation projects by enterprise size**

In per cent

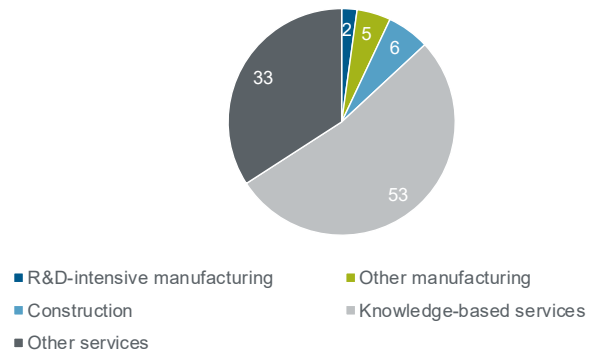


Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

**Figure 26: SMEs with completed digitalisation projects by sector**

In per cent

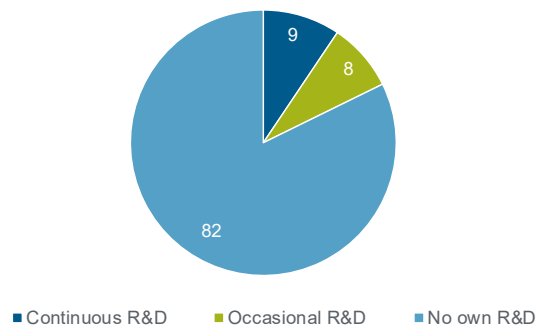


Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations

**Figure 27: SMEs with completed digitalisation projects with and without own R&D activities**

In per cent



Note: Figures extrapolated to the number of enterprises.

Source: KfW SME Panel, own calculations



## KfW SME Panel

The KfW SME Panel (KfW-Mittelstandspanel) has been conducted since 2003 as a recurring postal survey of small and medium-sized enterprises in Germany with annual turnover of up to EUR 500 million.

With data based on up to 15,000 companies a year, the KfW SME Panel is the only representative survey of the German SME sector, making it the most important source of data on issues relevant to the SME sector. As it is representative of all SMEs of all sizes and across all branches in Germany, the KfW SME Panel offers projections for even the smallest companies with fewer than five employees. A total of 9,889 SMEs took part in the current wave.

Analyses of long-term structural developments in the SME sector are performed on the basis of the KfW SME Panel. It gives a representative picture of the current situation and the needs and plans of SMEs in Germany. It focuses on annually recurring information on companies' performance, investment activity and financing structure. This tool is the only way to determine quantitative key figures for SMEs such as investment spending, loan demand and equity ratios.

The basic population used for the KfW SME Panel comprises all SMEs in Germany. These include private-sector companies from all sectors of the economy with annual turnover of not more than EUR 500 million. The population does not include the public sector, banks or non-profit organisations. Currently there are no official statistics providing adequate information on the number of SMEs or the number of people they employ. The survey used the German Company Register (Unternehmensregister) and the official employment statistics (Erwerbstätigenrechnung) to determine the current population of SMEs as a starting point.

The KfW SME Panel sample is designed in such a way that it can generate representative, reliable data that are as precise as possible. The sample is split into four groups: type of promotion, branches, firm size as measured by the number of employees, and region. In order to draw conclusions on the basic population based on the sample, the results of the survey are weighted/extrapolated. The four main stratification criteria are used to determine the extrapolation factors. These factors look at the distribution in the net sample (in line with the four group characteristics) in relation to their distribution in the population as a whole. Overall, two extrapolation factors are determined: an unlinked factor for extrapolating qualitative parameters to the number of SMEs in Germany, and a linked factor for extrapolating quantitative parameters to the number of employees in SMEs in Germany.

The survey is conducted by the Financial Services Division of GfK SE on behalf of KfW Group. The project received expert advice from the Leibnitz Centre for European Economic Research (ZEW) in Mannheim. The main survey of the 18th wave was conducted in the period from 10 February to 19 June 2020.

<sup>1</sup> Cf. OECD (2020), *The Digitalisation of Science, Technology and Innovation: Key Developments and Policies*, Paris: OECD Publishing, OECD (2019), *Digital Innovation. Seizing Policy Opportunities*, Paris: OECD Publishing, or Keuper, F. et al. (2013), *Digitalisierung und Innovation. Planung – Entstehung – Entwicklungsperspektiven (Digitalisation and innovation. Planning – Creating – Development Prospects – our title translation, in German only)*. Springer, Gabler Verlag.

<sup>2</sup> Cf. Bresnahan, T. F. and Trajtenberg, M. (1995): *General purpose technologies, engines of growth?* *Journal of Econometrics* 65(1), p. 83–108.

<sup>3</sup> Cf. Behrens, V. and Trunschke, M. (2020), *Industry 4.0 Related Innovation and Firm Growth*, ZEW Discussion Paper No. 20 – 070; Niebel, T. et al. (2019), *BIG Data – BIG gains? Understanding the link between Big Data Analytics and Innovation*; *Economics of Innovation and New Technology* 28(3), p. 296–316; Gal, P., et al. (2019): *Digitalisation and productivity: In search of the holy grail – Firm-level empirical evidence from EU countries*; OECD Economics Department Working Papers No. 1533; Bertschek, I. et al. (2013), *More Bits – More Bucks? Measuring the Impact of Broadband Internet on Firm Performance*, *Information Economics and Policy* 25(3), p. 190–203; Cardona, M.; et al. (2013), *ICT and productivity: conclusions from the empirical literature*, *Information Economics and Policy* 25, p. 109–125, or Kretschmer, T. (2012), *Information and Communication Technologies and Productivity Growth: A Survey of the Literature*; OECD Digital Economy Papers, No.195, OECD Publishing.

<sup>4</sup> Cf. Dauth, W. et al. (2017), *German Robots – The Impact of Industrial Robots on Workers*, IAB Discussion Paper 30/2017.

<sup>5</sup> Examples of earlier digitalisation waves were the New Economy Boom of the second half of the 1990s, the rise of the PC since the 1980s, and industrial robots since the 1970s.

<sup>6</sup> Cf. DESI (2019); <https://ec.europa.eu/digital-single-market/en/desi>; last retrieved on 29 January 2021. The United Kingdom is still included in the indicator.

<sup>7</sup> Cf. latest version: Federal Ministry of Economics and Technology (2018): *Monitoring-Report Wirtschaft DIGITAL 2018. Der IKT-Standort Deutschland und seine Position im internationalen Vergleich (Germany as an ICT location and its position in international comparison – our title translation, in German only)*.

<sup>8</sup> Cf. Abel-Koch, J. (2020): *Coronavirus crisis drives shift to flexible and digital working in SMEs*, *Economics in Brief* No. 197, KfW Research und Demmelhuber, K., Englmaier, F.; Leiss, F.; Möhrle, S.; Peichl, A. and Schröter, T. (2020): *Working from Home Before and After the Coronavirus: Effects and Gender Issues*, ifo Schnelldienst digital, 2020, 1, No. 14.

<sup>9</sup> Cf. Federal Statistical Office, press release No. 161 dated 8 May 2020.

- <sup>10</sup> Cf. Bertschek, I. (2020): Digitalisierung – der Corona-Impfstoff für die Wirtschaft (*Digitalisation as a coronavirus vaccine for the German economy* – in German only), Wirtschaftsdienst 2020/9, p. 653–656.
- <sup>11</sup> Cf. Schwartz, M., and Gerstenberger, J., (2021): Zwar belastet die Corona-Krise den Mittelstand auch zu Jahresbeginn, allerdings bleibt die Lage trotz des Lockdowns stabil (*The coronavirus crisis is weighing on SMEs at the start of the year too, but the situation is steady despite the lockdown* – in German only), Focus on Economics No. 315, KfW Research.
- <sup>12</sup> Cf. Schwartz, M., and Gerstenberger, J., (2020): [KfW SME Panel 2020](#), Coronavirus pandemic has dampened expectations for 2020 – SMEs entered the crisis from a strong position, KfW Research.
- <sup>13</sup> Thus, the share of enterprises which the coronavirus crisis has put at risk of closure is 26% among small businesses with fewer than five employees, while that share is a mere 7% among SMEs with 50 and more employees.
- <sup>14</sup> Cf. Bertschek, I. et al. (2019): ICT and Resilience in Times of Crisis: Evidence from Cross-Country Micro Moments Data, *Economics of Innovation and New Technology*, 28(8), p. 759-774.
- <sup>15</sup> The following analysis is based on the KfW SME Panel, a representative longitudinal data section for small and medium-sized enterprises in Germany with an annual turnover of up to EUR 500 million.
- <sup>16</sup> Cf. Zimmermann, V. (2018): [Determinants of digitalisation and innovation behaviour in the SME sector](#), Focus on Economics No. 236, KfW Research.
- <sup>17</sup> Cf. Zimmermann, V. (2020): [Business Survey 2020. Proportion of businesses planning digital projects stagnates on a high level](#), KfW Research.
- <sup>18</sup> The number of employees is calculated including the active owners but excluding trainees and apprentices. Two part-time employees are counted as one full-time employee.
- <sup>19</sup> Cf. Zimmermann, V. (2020), [KfW SME Digitalisation Report 2019. Digitalisation projects are gaining traction in the SME sector but digitalisation expenditure has remained low for years](#), KfW Research.
- <sup>20</sup> Cf. Zimmermann, V. (2020), [How SMEs fund their innovation and investment expenditure – a comparison](#), Focus on Economics No. 280, KfW Research, or Zimmermann, V. (2018): [Business Survey 2018. Digitalisation is gaining momentum](#), KfW Research.
- <sup>21</sup> Cf. Zimmermann, V. (2018): [Determinants of digitalisation and innovation behaviour in the SME sector](#), Focus on Economics No. 236, KfW Research.
- <sup>22</sup> Cf. Schlegelmilch, B. (1988): Der Zusammenhang zwischen Innovationsneigung und Exportleistung (*The correlation between innovation propensity and export performance* – our title translation, in German only). Ergebnisse einer empirischen Untersuchung in der deutschen Maschinenbauindustrie (*Results of an empiric survey of the German engineering industry* – our title translation, in German only), in: *Zeitschrift für betriebswirtschaftliche Forschung* 50(3), p. 227–269; Greenaway, D. and Kneller, R. (2007), Firm heterogeneity, exporting and foreign direct investment, *The Economic Journal* 117(517), p. F134–F161 and Anderson, M. and Löf, H. (2009), Learning by Exporting Revisited – the role of intensity and persistence, *Scandinavian Journal of Economics* 111(4), p. 893–913.
- <sup>23</sup> Cf. Hottenrott, H and Peters, B. (2012): Innovative capability and financing constraints for innovation – more money, more innovation? *Review of Economics and Statistics* 94(4), p. 1126–1142 and Zimmermann, V. (2018): [Determinants of digitalisation and innovation behaviour in the SME sector](#), Focus on Economics No. 236, KfW Research.
- <sup>24</sup> Cf. OECD (2015) (ed.), Frascati Manual 2015. Guidelines for collecting and reporting data on research and experimental development.
- <sup>25</sup> Cf. Zimmermann, V. (2019), [Business Survey 2019. More and more businesses have firm plans for digitalisation, hurdles also more widely acknowledged](#), KfW Research, and Zimmermann, V. (2017): [Business Survey 2017. Digital transformation of industries: broad basis, multiple barriers](#), KfW Research.
- <sup>26</sup> Cf. Zimmermann, V. (2018): [Business Survey 2018. Digitalisation is gaining momentum](#), KfW Research.
- <sup>27</sup> Cf. Gerstenberger, J. and Schwartz, M. (2020), [KfW SME Panel 2020](#), Coronavirus pandemic has dampened expectations for 2020 – SMEs entered the crisis from a strong position, KfW Research.
- <sup>28</sup> Cf. Zimmermann, V. (2020): [KfW SME Digitalisation Report 2019. Digitalisation projects are gaining traction in the SME sector but digitalisation expenditure has remained low for years](#), KfW Research.
- <sup>29</sup> Cf. also Zimmermann, V. (2021): [Artificial intelligence: high growth potential but low penetration in SMEs](#), Focus on Economics No. 318, KfW Research.
- <sup>30</sup> Cf. Commission of Experts for Research and Innovation (2021): Report on Research, Innovation and Technological Performance in Germany. 2021 Report, and Bertschek et al. (2020): *Kleine und mittlere Unternehmen unterstützen. Forschungszulage an die Erfordernisse der Corona-Krise anpassen (Supporting small and medium-sized enterprises. Adapting research grants to the conditions of the coronavirus crisis* – our title translation, in German only). Policy Brief. No. 4-2020. Berlin: EFI
- <sup>31</sup> Cf. Andres, R. et al. (2020): Capital incentive policies in the age of cloud computing: An empirical case study, *OECD Science, Technology and Industry Working Papers*, No. 2020/07, OECD Publishing, Paris.
- <sup>32</sup> Cf. Andrews, D. et al. (2015), Frontier Firms, Technology Diffusion and Public Policy: Micro Evidence from OECD Countries, *OECD Productivity Working Paper* no. 2, Andrews, D. et al. (2016) The best versus the rest: The global productivity slowdown, divergence across firms and the role of public policy, *OECD Productivity Working Paper* No.5, or Gal. P. et al. (2019), Digitalisation and productivity: In search of the holy grail – Firm-level empirical evidence from EU countries, *OECD Economics Department Working Papers* No. 1533.
- <sup>33</sup> Cf. Arntz, M. (2019), Digitalization and the Future of Work: Macroeconomic Consequences, ZEW Discussion Paper No. 19-024.
- <sup>34</sup> Cf. Zimmermann, V. (2019): [Business Survey 2019. More and more businesses have firm plans for digitalisation, hurdles also more widely acknowledged](#), KfW Research
- <sup>35</sup> Cf. Schwartz, M. (2016): [Harnessing the potential of digitalisation – with data protection and IT security](#), Focus on Economics No. 117, KfW Research.