

# »» SMEs and digitalisation: The current position, recent developments and challenges

No. 138, 18 August 2016

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The extent of digitalisation in SMEs is not nearly as great as might be expected, given the level of public debate about the issue. Around a third of German SMEs are still in the early stages of digitalisation. Pioneers – companies that already rely on digital products and services, apps or Industry 4.0 – remain a minority, representing just under a fifth of the total.

But this does not mean that SMEs are not willing to address the issue. Four out of five SMEs have carried out digitalisation projects during the past three years and thereby increased their level of digitalisation. However, companies only commit relatively small amounts of capital to such projects. Just under half invest less than EUR 10,000 a year in digitalisation.

A shortage of IT skills or staff (67%), data protection and data security (62%), high investment and operating costs (59%) and internet connection speeds (58%) are the mostly commonly cited obstacles to digitalisation. However, removing these obstacles will not on its own be enough to create progress in digitalisation, because many SMEs are not aware of the advantages and benefits of increased digitalisation. Demonstrating specific areas where savings can be made and providing examples of best practice may make companies more willing to pursue further digitalisation. In the future, companies' position within supply chains will also push them towards greater levels of digitalisation.

If the funding requirements for digitalisation increase, there will be more funding shortfalls. Along with funding programmes for pioneering companies, easily accessible financial support measures aimed at implementing new applications and establishing knowledge pools within companies would appear to be a constructive solution for the broad majority of SMEs.

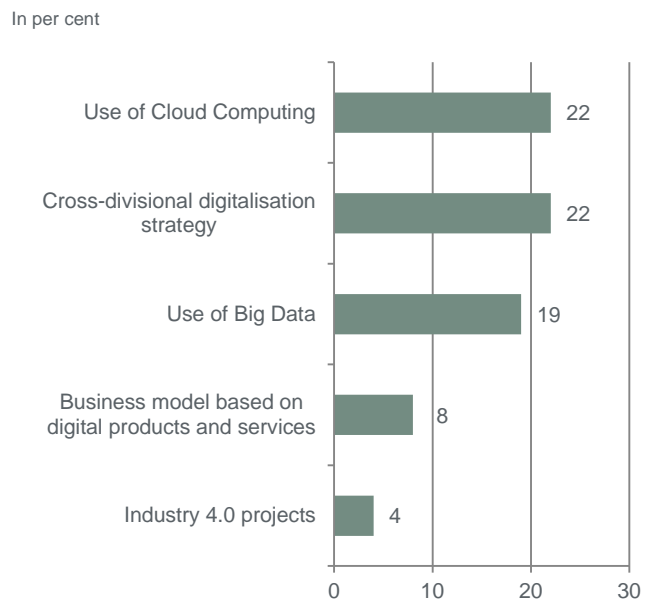
Digitalisation is a major driver of future competitiveness and innovation. Progress made in digitalisation by SMEs and the direction in which it is moving were the subject of a study carried out on behalf of KfW by the Centre for European Economic Research (*Zentrum für Europäische Wirtschaftsforschung – ZEW*) in Mannheim.<sup>1</sup> At the heart of the study were four questions: To what degree are SMEs already using digital technologies and business models? What steps are SMEs taking to increase the level of

digitalisation in their companies? What resources are they devoting to digitalisation? What challenges do they face as part of this process? This article presents a summary of the main findings of the study.

### The extent of digitalisation among SMEs varies widely

It often takes quite a long period of time for new technologies to gain widespread acceptance. For this reason, one area of focus for the study involved investigating the extent of maturity which digitalisation has already achieved within SMEs. It must also be remembered that the term 'digitalisation' encompasses a wide range of possibilities in terms of the extent of adoption of digital technologies. This can range from basic elements (such as using computers or the internet) and the use of modern technology (e.g. cloud computing or big data) to advanced applications, such as adopting a business model based on digital products and services or using elements from Industry 4.0.

**Figure 1: Adoption of advanced elements of digitalisation**



Note: Figures extrapolated to the number of enterprises.

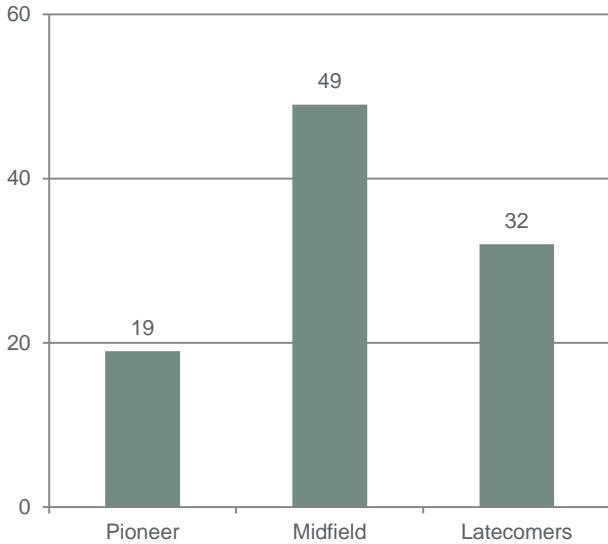
Source: Saam et al. (2016)<sup>1</sup>

It is apparent that, in many SMEs, modern digital technologies have gained only limited acceptance. For example, only 22% of SMEs use cloud computing (Figure 1), and cross-divisional digitalisation strategies are just as

uncommon. Only 19% of companies currently work with ‘big data’. Business models based on digital products and services, or companies that have already implemented Industry 4.0 projects, are even less common, accounting for 8 and 4% of SMEs respectively.

**Figure 2: Level of digital maturity among SMEs**

In per cent



Note: Figures extrapolated to the number of enterprises.

Source: Saam et al. (2016)<sup>1</sup>

The study looked at a total of 14 characteristics when considering the extent of digitalisation within SMEs. A cluster analysis based on these characteristics reveals that 19% of SMEs fall into the category of ‘pioneers’ (Figure 2). These companies are characterised by the fact that their business models involve offering digitally networked products, services or apps, or have already completed Industry 4.0 projects (or plan to do so).

The digital midfield encompasses 49% of SMEs. These companies use individual examples of digitally networked information and communication applications, such as cloud computing, big data or social media applications. Mobile devices and cross-departmental digitalisation strategies are also more common among such companies. However, they are very far from making full use of the opportunities offered by these applications.

The ‘latecomers’ category comprises 32% of SMEs. Adoption of even basic applications, such as having their own internet presence, is below average at these companies. Applications in the field of networked information and communications are used only occasionally.

A third of SMEs are therefore still only in the early stages of digitalisation. Although the majority have begun to move into a higher stage of digitalisation, they are far from tapping its full potential. Furthermore, buzzwords widely used within public discussion on the issue, such as ‘Industry 4.0’ or ‘digital platforms’, must not be allowed to hide the fact that the majority of SMEs have not yet reached a stage where such terms are within reach as operational realities. In fact there is still a need for expansion at more basic levels of digitalisation.

**Four fifths of companies are working on digitalisation projects**

How has digitalisation progressed within SMEs over the past three years? In this article, digitalisation projects are taken to include both technological and competence projects (Table 1). IT investment that consists solely of replacing existing systems or routine investment is not included. As well as the innovative side of IT investment in the traditional sense of the term, however, investment in IT skills (such as training etc.) is part of digitalisation projects.

Eighty-three per cent of SMEs implemented digitalisation projects during the period from 2013 to 2015 (Figure 3). Almost all companies with 150 or more employees (98%) did so. Hence for companies of this size, the question is less about whether digitalisation projects have been carried out than it is about their scope.

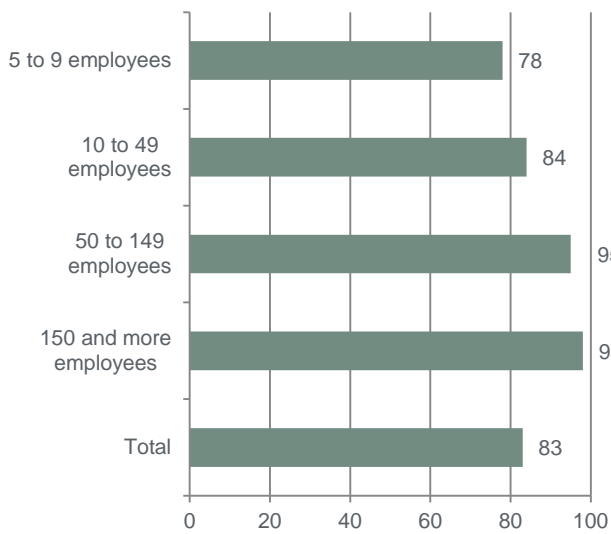
**Table 1: Types of technological and skills projects**

Technological projects	Competence projects
Acquisition of new types of, or significantly improved, hardware	IT training for staff
Writing or introducing new software	Use of IT consulting services
Fundamental redesign of company web site (new functionality)	Reorganisation of workflow to include new procedures
Use of new types of IT service (e.g. cloud computing)	Developing new digital sales and marketing concepts
Linking the IT behind business processes and areas	
Introducing new IT security concepts and applications	

Source: Saam et al. (2016)<sup>1</sup>

**Figure 3: Implementation of digitalisation projects by company size**

In per cent



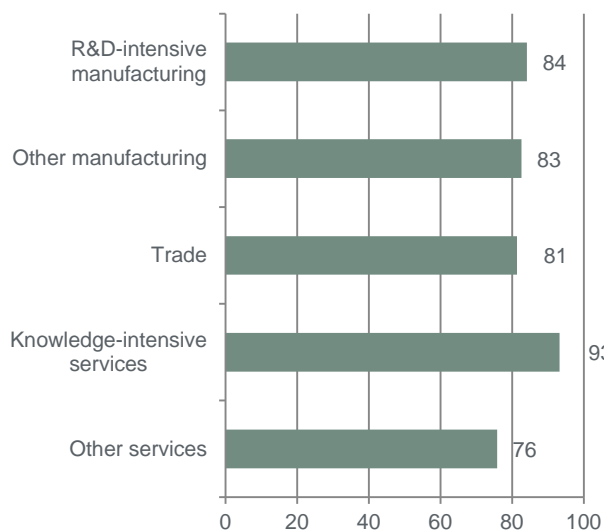
Note: Figures extrapolated to the number of enterprises.

Source: Saam et al. (2016)<sup>1</sup>

Seventy-eight per cent of small companies (with between 5 and 9 employees) have expanded their level of digitalisation. The vast majority of small companies are therefore also pushing forward the level of digitalisation in their business. However, a sizeable number of small companies (at least a fifth) have engaged only to a limited extent with the trend towards digitalisation.

**Figure 4: Implementation of digitalisation projects by economic sector**

In per cent



Note: Figures extrapolated to the number of enterprises.

Source: Saam et al. (2016)<sup>1</sup>

The split by economic sector shows that it is primarily companies involved in knowledge-intensive services (e.g. IT

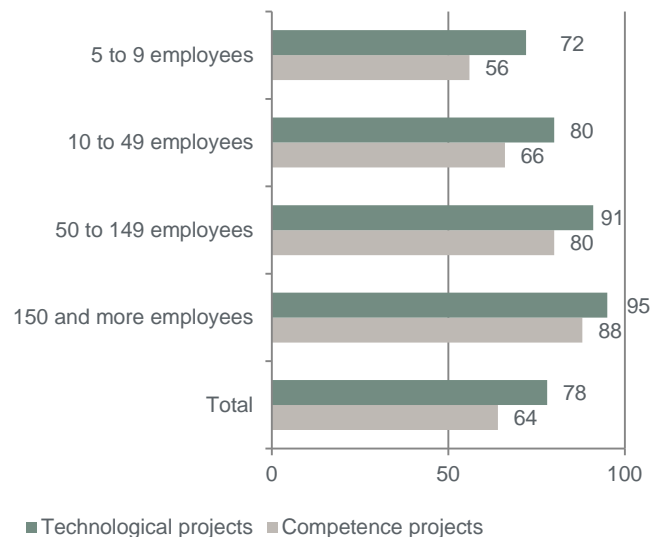
and information service providers, legal and tax advisers, business consultancies) that have carried out most digitalisation projects (93%). Companies in the 'other services' category (e.g. transport, warehousing) are the least likely (76%) to be involved in increasing their level of digitalisation (Figure 4).

**Technological projects more common than competence projects**

Seventy-eight per cent of SMEs have carried out technological projects, compared with a figure of 64% for competence projects (Figure 5). The difference in the proportion of companies that have completed technological or competence projects is more pronounced among small companies than large ones. Small companies especially are further behind when it comes to developing digital skills. In the medium term, there is a danger that this will restrict the use of advanced applications by small companies.

**Figure 5: Implementation of digitalisation projects by project type and company size**

In per cent



Note: Figures extrapolated to the number of enterprises.

Source: Saam et al. (2016)<sup>1</sup>

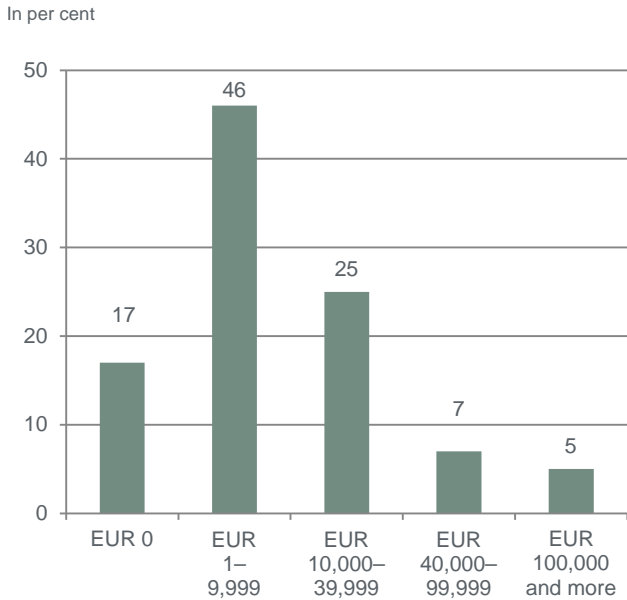
A more in-depth analysis shows that companies are most likely to improve or replace software or hardware (47% and 45% of companies, respectively). In contrast, connecting business processes/areas is the least common activity (21%). IT training is the most widespread competence project (40%). Companies are considerably less likely to be involved in developing new online sales or marketing concepts (23%).

**Low levels of spending are the norm**

Spending levels indicate that the expansion of digitalisation is primarily taking place in small steps. Close to half of companies spent less than EUR 10,000 per year on digitalisation projects during the period between 2013 and 2015 (Figure 6). Only 5% of SMEs spent EUR 100,000 or more on digitalisation. Crucially, projects aimed at linking the

IT behind different business processes / areas, or which involve reorganising workflows to add new digital procedures, require high levels of expenditure. In total, SMEs spend around EUR 10 billion a year on digitalisation projects.

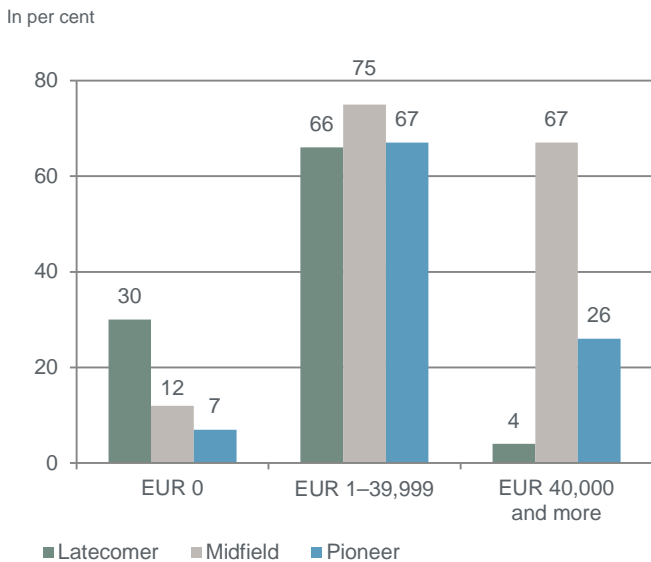
**Figure 6: Distribution of spending on digitalisation projects**



Note: Figures extrapolated to the number of enterprises.

Source: Saam et al. (2016)<sup>1</sup>

**Figure 7: Distribution of spending on digitalisation projects by cluster**



Note: Figures extrapolated to the number of enterprises.

Source: Saam et al. (2016)<sup>1</sup>

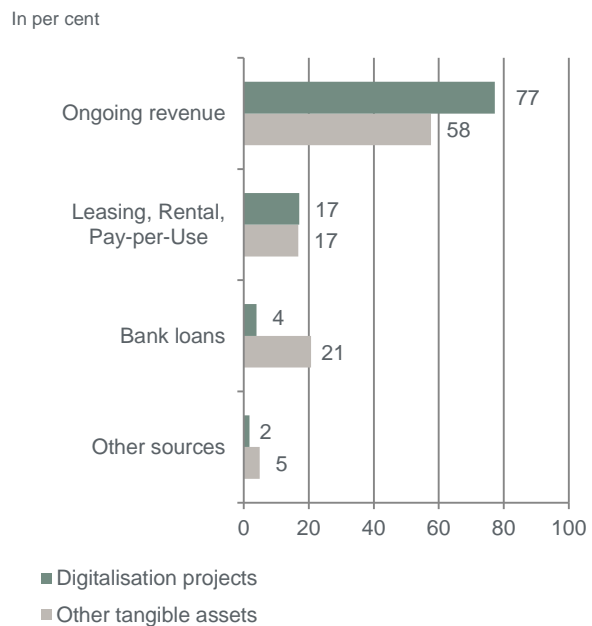
The split of spending by digitalisation cluster shows that expenditure of less than EUR 40,000 is the most common in all three clusters (Figure 7). However, it is most frequently pioneering companies (more than a quarter of them) that spend higher amounts on digitalisation. At the same time, pioneers are most likely to be planning to increase their

expenditure on digitalisation in the coming years. We should therefore expect to see a further but moderate widening of the gap between different companies' efforts at digitalisation.

**Cash flow is the primary source of financing**

Seventy-seven per cent of digitalisation financing are funded from companies' ongoing revenues. Bank loans play only a minor role, accounting for 4% of the total (Figure 8). Financing of digitalisation therefore differs considerably from the way investments in fixed assets are funded, where bank loans account for 21% and ongoing revenues for only 58% of the financing volume.

**Figure 8: Split by type of financing**



Note: Figures extrapolated to the companies' sales volumes.

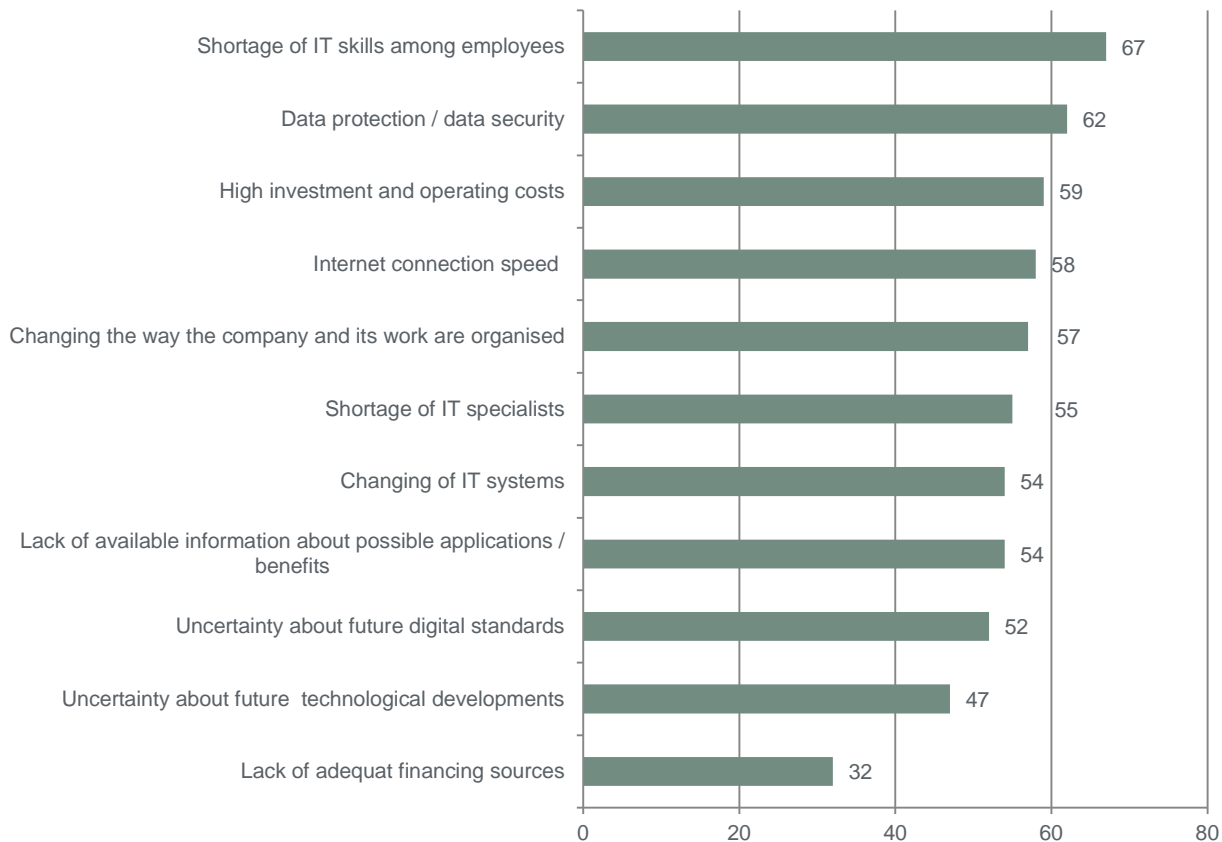
Source: Saam et al. (2016)<sup>1</sup>

However, there are similarities in the way digitalisation and innovation projects are funded. Innovation is also dominated by funding from internal sources, with only a small proportion coming from bank loans.<sup>2</sup> Aside from the relatively small volumes of financing required, this may be due to the particular characteristics of the projects involved in each case. The success of digitalisation projects is subject to a higher level of risk, for example as a result of uncertainties relating to future standards or the legal framework. It is also often difficult for external investors to evaluate such projects ('information asymmetry'), since digitalisation projects commonly involve applications or solutions to problems that are specific to a given company and where the employees involved develop related expertise.

Another important consideration is the fact that digitalisation projects are largely made up of staff costs and advance payments, with only a relatively small amount spent on tangible investments. This reduces the possibility of offering up elements of the project as collateral. These characteristics make external investors less willing to finance digitalisation projects. As a consequence, they demand higher risk

**Figure 9: Obstacles to implementing digital technologies**

In per cent



Note: Proportion of companies that see the issue concerned as something of a barrier or very much a barrier. Figures extrapolated to the number of enterprises.

Source: Saam et al. (2016)<sup>1</sup>

premiums or, more often, will not provide funding at all. Empirical studies have established that access to bank loans to finance digitalisation projects is more difficult than when funding 'traditional' investments, for example.<sup>3</sup>

### IT skills, data security and internet connection speed are major challenges

When asked what factors companies viewed as impeding their progress in terms of digitalisation, 'shortage of IT skills among employees' was the main answer given, accounting for 67% of responses (Figure 9). Responses to 'changing the way the company and its work are organised' (57%), 'shortage of IT specialists' (55%) and 'lack of available information about possible applications/benefits' – all of which also fall under the area of 'skills and organisation' – underline how important organisational and skill-related obstacles are for most SMEs when it comes to digitalisation.

Questions relating to data protection and data security ranked second, with 62% of responses. High investment and operating costs were cited by 59% of companies. The fact that costs were cited more frequently than 'lack of financing sources' indicates that many companies view the costs of digitalisation as problematic in relation to the perceived benefits. For many companies, therefore, the benefit to their

own production, or of having their own digital product or service for their customers is not clear. Experts have noted a general scepticism in relation to high levels of IT expenditure specifically in companies that are not counted among the pioneers. IT expenditure is frequently seen as a pure cost with no major potential for innovation.

'Internet connection speed' was ranked fourth, with 58% of responses. It is apparent that companies that already have a connection speed of more than 50 Mbit/s are not significantly happier with their internet connection speed. Companies that already have a fast internet connection also have high expectations and would welcome a further increase in the speed of their connection.

Uncertainties with regard to future digital standards and the development of technology represent obstacles to digitalisation for 52 and 47% of companies, respectively. Thirty-two per cent of companies consider themselves to be held back by a 'lack of financing sources' when it comes to implementing digitalisation projects. Funding problems, therefore, do not currently rank highly. Given the special characteristics of digitalisation projects, however, there is reason to fear that funding problems will become increasingly acute once companies start expanding their efforts at

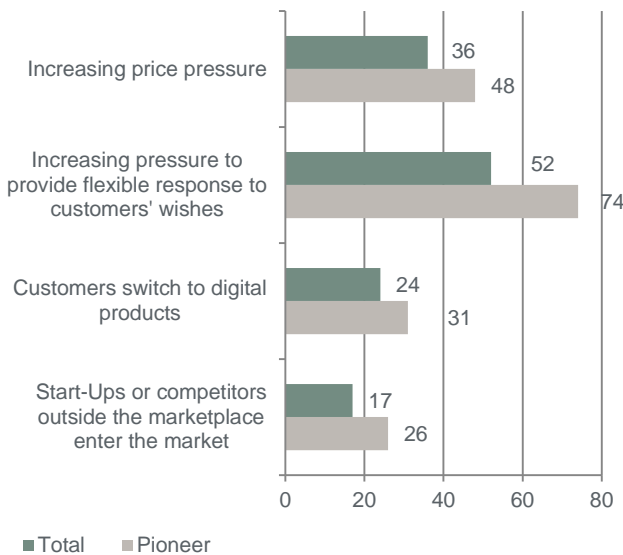
digitalisation.

**Growing competitive pressure is primarily a concern for pioneers**

Finally, the companies were asked how digitalisation will change their competitive position in future. The most frequent expectation among SMEs is that the pressure to provide a flexible response to customers' wishes will increase (52%). Thirty-six per cent of SMEs anticipate increasing price pressure as a result of digitalisation (Figure 10). Considerably fewer SMEs expect customers to switch to digital products or that start-ups or competitors outside the marketplace will enter the market (24 and 17%, respectively).

**Figure 10: Changes in competitive position as a result of increasing digitalisation**

In per cent



Note: Proportion of companies that consider the issue concerned to be 'highly likely' or 'somewhat likely'. Figures extrapolated to the number of enterprises.

Source: Saam et al. (2016)<sup>1</sup>

It is striking that pioneering companies more frequently view each of the threats listed as likely. Whether or not companies' attitudes are reasonable is hard to judge. While there is always the danger that digital latecomers or midfield companies underestimate the threat, this reading does nonetheless help to explain why many SMEs' have made relatively modest efforts to embrace digitalisation.

**Conclusion**

Digitalisation is a major driver of future competitiveness and innovation in the German economy. Nonetheless, digitalisation among SMEs is far behind the level that might be expected given the level of public discussion on this issue. Around a third of companies are only in the early stages of digitalisation. Pioneers – companies whose business models contain digital elements or, for example, implement Industry 4.0 projects – make up less than a fifth of SMEs.

While the vast majority of SMEs are increasing their level of digitalisation, they spend relatively small amounts on doing so. Just under half invest less than EUR 10,000 a year in digitalisation. A shortage of IT skills, data protection and data security, high investment and operating costs and internet connection speeds are the issues mostly commonly cited by SMEs as obstacles to digitalisation.

The German Federal Government's goal is to expand the internet into a comprehensive gigabit network. The Results of this survey confirm that internet connection speeds are a significant obstacle to digitalisation. It is less feasible for SMEs in particular to make progress with network connection solutions if they must cover the costs themselves. Especially in rural areas, market forces should not be expected to drive expansion. Government support will be required for network expansion, particularly in these areas.

Data security and liability risks are cited as an obstacle to digitalisation, principally by Industry 4.0 companies. Risks relating to data protection and data security are also significant barriers for the broad majority of SMEs. Legal regulations are needed, but so too are measures to establish expertise within companies around digital risks. In the medium term, companies will be forced to learn how to handle digital risks, just as they already do for conventional criminality.

With respect to IT skills, action is needed both in terms of training specialist IT staff and educating and improving the skills of employees. Entering the Industry 4.0 domain significantly changes staffing requirements and job profiles. Above all, there will be greater demand for employees with data analysis skills and a combination of expertise in IT and mechanical engineering. Job profiles within Germany's dual system of vocational training and engineering education need to be kept up to date. An adequate number of specialised workers must also be trained. In addition, employees must receive more ongoing training and learn additional skills.

However, it is unlikely that removing obstacles will be enough to create progress in digitalisation. The study instead demonstrates that many companies are not aware of the opportunities and benefits associated with digitalisation. A promising approach would therefore seem to be to demonstrate specific areas where savings can be made by more intelligent use of IT, such as reducing waste, stock levels or energy usage, and to provide examples of best practice. It should also be noted that digitalisation – particularly in the field of Industry 4.0 – will increasingly take place via supply chains. Companies working in the business-to-business segment will face specific digitalisation requirements within supply chains. As a consequence, their financing requirements will increase.

Because of the special characteristics of digitalisation projects, funding shortfalls should be expected to occur more frequently if financing requirements rise. Pioneering



companies in the field of Industry 4.0 already make very frequent use of funding programmes. However, such programmes impose very high requirements in terms of the level of innovation within the projects they fund, and the amount of research and development they involve. For the

broad majority of SMEs, easily accessible financial support measures aimed at implementing new applications and establishing knowledge pools within companies would appear to be a constructive solution. ■

<sup>1</sup> Cf. Saam, M., Viète, S. and S. Schiel. (2016): Digitalisierung im Mittelstand: Status Quo, aktuelle Entwicklungen und Herausforderungen [SMEs and digitalisation: The current position, recent developments and challenges]. Forschungsprojekt im Auftrag der KfW Bankengruppe. Zentrum für Europäische Wirtschaftsforschung (ZEW), Mannheim (in German).

<sup>2</sup> Cf. Zimmermann, V. (2014): SME Panel 2013: How German SMEs finance their innovations. KfW Economic Research, Focus on Economics No. 50, 3 April 2014.

<sup>3</sup> Cf. Zimmermann, V. (2016): Unternehmensbefragung 2016. Finanzierungsklima stabil auf Allzeithoch – Finanzierungsanlass entscheidet mit über Kreditzugang [Business survey 2016. Financing climate remains better than ever – financing purpose is major determinant of credit access]. Section 4. KfW Research (in German).