

## High skills requirements make hiring a challenge, especially for innovative enterprises

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Author: Dr Volker Zimmermann, phone +49 69 7431-3725, [volker.zimmermann@kfw.de](mailto:volker.zimmermann@kfw.de)

More than half of innovative enterprises (52%) expect to run into difficulties filling vacant positions. This proportion is two fifths higher in businesses that innovate than in those that do not (37%). The main recruitment barrier is the general shortage of qualified workers, with both innovative and non-innovative firms facing a lower number of applicants and high salary demands in equal measure (where the probability of occurrence is 80% in typical innovators and around 35% among non-innovators).

The greater difficulties innovators face trying to fill job vacancies are also not attributable to the vacant position or company being less attractive. Rather, the skills required from applicants differ between innovators and non-innovators. Innovative businesses find that their requirements for mathematical/statistical skills (+25%), social skills (+20%) and digital skills (+55% basic and +134% advanced skills) are more likely not to be met than other businesses. These high requirements are due to the fact that innovative enterprises use more modern technologies and have a more modern work and business organisation. The demands of their innovation processes also result in a higher need for the skills mentioned.

Despite a broad range of targeted measures, small and medium-sized enterprises are unable to fully resolve the recruitment problems on their own. A variety of approaches are available for economic and educational policy to support enterprises. The general skills shortage can be mitigated by activating domestic labour force potential, empowering a higher number of young people to engage in vocational training, upskilling unskilled or semi-skilled unemployed people and stepping up efforts to promote continuing education and increase targeted skilled migration.

Specific measures for addressing the needs of innovative businesses involve soft skills and digital skills as well as mathematical/statistical abilities. With respect to digital skills, one approach is to mitigate the shortage of IT skills, particularly of university-trained IT specialists. To achieve this, more young people need to be motivated to study information technology and the dropout rate needs to be reduced. Improving digital skills across the broader workforce requires digital content to be more closely integrated into school, vocational and academic curricula. Another approach is to provide greater incentives for relevant continuing education activities.

Mathematical/statistical abilities are key skills acquired primarily in school. In the recent past, Germany has been less

successful in teaching these skills. Efforts should therefore be stepped up to improve the teaching of mathematical skills in schools.

Last but not least, promoting the development of social skills is a starting point for economic and education policy. This is another area where school upbringing has a part to play. As different occupational profiles require different social skills, the way in which vocational training and academic education are designed is also important for imparting appropriate social skills. In the future, the necessary skills need to be taught as part of the curricula here as well.

Innovation is the driver of economic growth and productivity development and accelerates structural change.<sup>1</sup> In developed economies it is therefore regarded as a guarantor for safeguarding and increasing prosperity<sup>2</sup> and forms the basis for the transformation to sustainable economic management and living. Innovation activity is therefore of major importance for economic and social development.

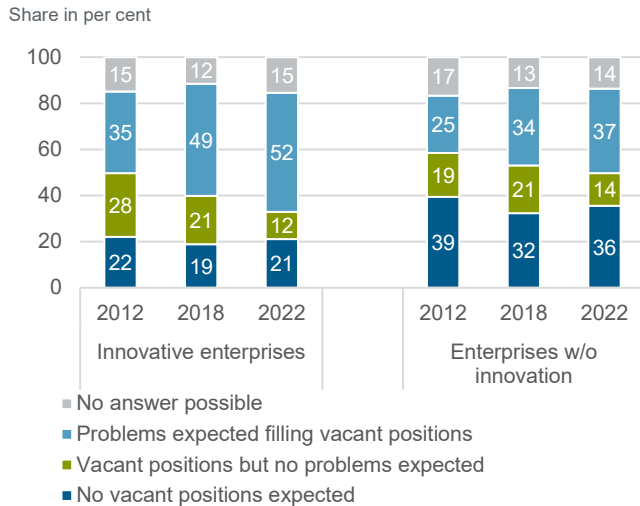
One development of the past years is that the insufficient availability of skilled workers has increasingly become a bottleneck for businesses.<sup>3</sup> Since it was launched in the year 2017, the KfW-ifo Skilled Labour Barometer has recorded a significant worsening of the skills shortage situation. Under the current survey, 39% of the businesses interviewed reported that their business activity was disrupted by a shortage of skilled workers.<sup>4</sup> The Cologne Institute of Economic Research determined that the skilled labour deficit, i.e. the number of open vacancies for which there are arithmetically no suitably qualified unemployed workers in the country, reached a new record high of 630,000 people in 2022.<sup>5</sup>

The present study therefore asks to what extent difficulties filling vacancies are a problem for innovators, and what the causes are for these companies' recruitment problems.

### More than half of innovative enterprises expect to run into difficulties filling vacant positions

Difficulties in filling vacancies are a frequent problem for SMEs too and one that has worsened considerably in the past approx. ten years. Thus, the share of SMEs expecting to face problems filling vacancies in the next three years increased by nearly 50% between 2012 and 2022.<sup>6</sup>

Figure 1: Changes in the hiring situation over the years



Sources: KfW SME Panel 2022, own calculation.

That share rose from 35 to 52% (Figure 1) among innovative SMEs, which is two fifths higher than in those businesses that do not innovate (37%). By contrast, the share of innovators expecting vacant positions that will need to be filled but anticipate no hiring problems fell by more than half from 28% to 12% during the same period. The share of businesses not expecting any unstaffed positions is more than one third lower among innovators than among non-innovators.

A likely major driver of the lower share of enterprises without vacancies among innovators is that innovative firms typically grow in the years after introducing an innovation.<sup>7</sup> The reasons for the more pronounced difficulties these businesses face in filling vacancies are examined in detail below.

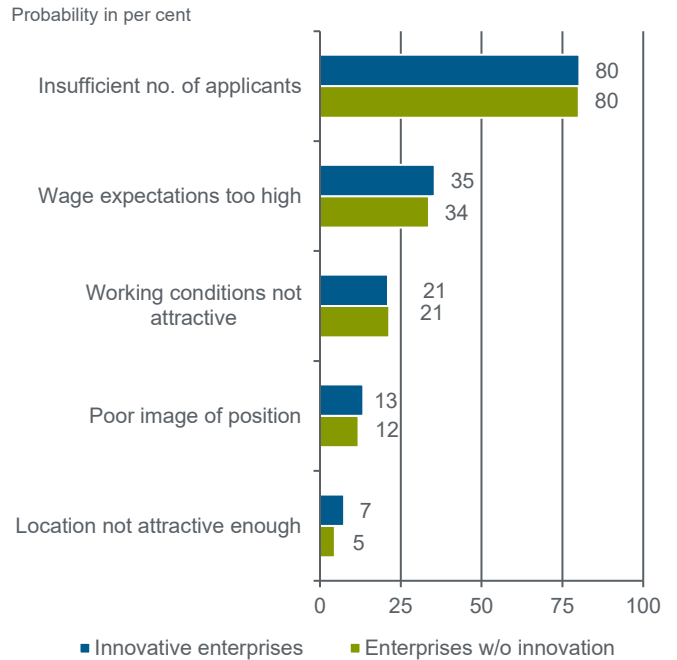
**A statistical method was used to analysis the reasons for recruitment problems**

As the influences of various factors on a situation can overlap, simple, descriptive analyses often do not clearly show what factors are decisive for an observed correlation. In the following we therefore use the statistical method of regression analysis (see box 'Investigative methodology' at the end). Regression analyses isolate the influences of overlapping factors and can thus calculate the exact influence intensity on the matter observed for each (observed) influencing factor. A regression analysis can therefore identify the actual drivers of hiring problems which innovators and non-innovators face.

**Low number of applicants is the main reason for problems filling vacancies**

The recruitment challenge mentioned most often is the insufficient number of applicants (Figure 2). The likelihood of a typical SME with hiring problems stating this as a reason is 80%. No differences were identified in the frequency of mentions between innovators and non-innovators. The frequent mention of this aspect is probably the direct expression of the skills shortage in Germany.

Figure 2: Causes of difficulties filling vacancies



Note: Model calculation on the basis of regression analyses, only enterprises with recruitment problems.

Sources: KfW SME Panel 2022, own calculation.

**Differences in the attractiveness of positions between innovators and non-innovators are negligible**

Other causes follow by a wide margin. High wage demands rank second, with probabilities of 35 and 34% among innovators and non-innovators. High wage demands too can be a direct consequence of the skilled labour shortage. It is one reason jobseekers can increasingly choose between different openings and are therefore less willing to compromise on salary. This is followed by unattractive working conditions (21%) and the poor image of the position to be filled (13 and 12%). The difference in the effect of these factors between innovators and non-innovators is also negligible.<sup>8</sup>

Innovators perform slightly worse only with respect to location. With a probability of 7%, they report locational disadvantages more often than non-innovators (5%). Overall, businesses domiciled in rural regions rate their locational attractiveness more negatively than those in conurbations. Innovative businesses therefore perceive potential applicants' expectations on the location slightly more strongly than their non-innovative counterparts.

The differences in the severity of recruitment problems which innovators and non-innovators encounter are thus not closely connected to factors that determine the attractiveness of the business or position.

**Specific skills requirements make it difficult for innovators to fill vacancies**

By contrast, with respect to the qualifications that job applicants are expected to have, the requirements for important, specific qualifications and skills pose a recruitment problem more often for innovators than for other businesses (Figure 3).

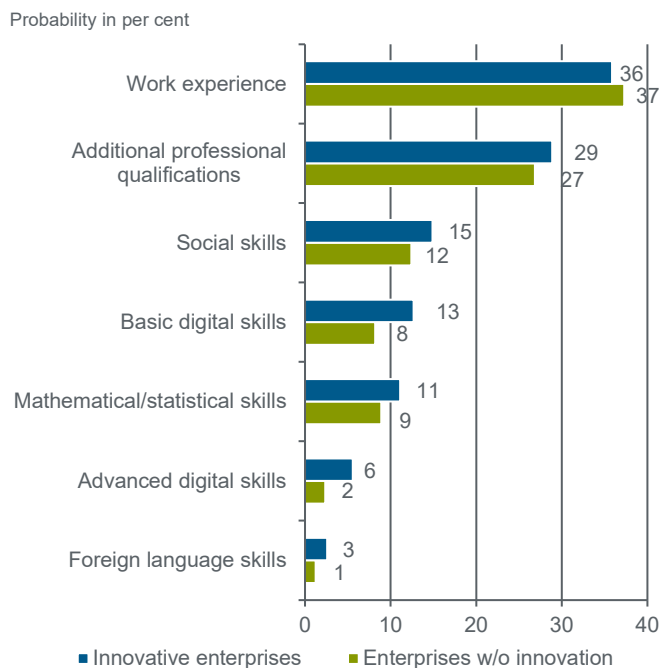
Among the skills aspects, insufficient work experience is the most common reason for SMEs' hiring problems. With a probability of 36 and 37%, innovators and non-innovators struggle with this recruitment problem almost equally.<sup>9</sup> Absence of additional technical qualifications ranks second with probabilities of 29 and 27%. The frequency of mentions does not differ significantly between innovators and non-innovators for this aspect either. The difference between the figures lies within the range of uncertainty of the analysis (i.e., it is not significant in a statistical sense).

### Innovative enterprises place higher demands on social skills

Lack of social skills ranks third among the skills-related hiring problems. With a probability of 15%, a typical innovative SME mentions insufficient social skills roughly 20% more often - taking into account the decimal places - than a non-innovator (12%).

This finding can be explained by the fact that the importance of interactive activities has increased in the past years as a result of the structural transformation. Such activities in particular place high demands on the social skills of the workforce.<sup>10</sup> Especially in innovative enterprises, which spearhead the structural transformation, the demands on social skills are therefore likely to be higher than in other enterprises.

Figure 3: Skills-related causes of difficulties filling vacancies



Note: Model calculation on the basis of regression analyses, only enterprises with recruitment problems.

Sources: KfW SME Panel 2022, own calculation.

Furthermore, social skills also have direct importance for generating innovations. Small and medium-sized enterprises develop the bulk of their innovations through informal processes of learning and understanding ('learning by doing, using and interacting').<sup>11</sup> They result from the normal production process and from the employees' close interaction within the business or with the business environment. The ability to innovate is therefore heavily based on exchange and broad

mutual learning across the workforce. This, too, demands higher social skills from all employees in the relevant businesses.

### Demands on digital skills differ between innovative and non-innovative enterprises

Absence of basic digital skills ranks fourth among the skills-related hiring problems, with a probability of 13% for innovators. Basic digital skills cover, for example, the ability to use computers and standard software. Innovators are more than one and a half times more likely than non-innovators to describe such demands on their applicants as a hiring problem (8%).

Advanced digital skills requirements, such as programming or more in-depth IT skills, are a less severe recruitment problem for SMEs (6th place). This is probably due primarily to the fact that the majority of SMEs is still undertaking basic digitalisation steps and will not approach more complex technologies until they are easier to handle.<sup>12</sup> Advanced digitalisation skills are therefore often not (yet) required. However, innovators are three times more likely to mention advanced digital skills requirements as a recruitment problem than non-innovators (6 vs. 2%).

The higher importance of digital skills for innovators is attributable to the fact that innovation and digitalisation are currently closely linked. Thus, innovators employ more advanced technologies more often in their business activities than non-innovators, and these often include digital technologies.<sup>13</sup> Moreover, digitalisation often provides the technological basis that enables innovation in the first place.<sup>14</sup> Digital data therefore represents important input in innovation processes 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.

### Innovators are more likely to demand mathematical/statistical skills

Lack of mathematical/statistical skills ranks fifth among the recruitment barriers, even before lack of advanced digital skills. Innovators are also a good one fourth more likely to mention them as barriers than non-innovators (innovators: 11%, non-innovators: 9%). A likely major reason for the more frequent mention is that the importance of analytical activities has also grown in the course of the structural transformation.<sup>15</sup> Such activities are often linked to mathematical/statistical skills. Besides, mathematical/statistical knowledge is also important for various activities involved in innovation, for example when they are linked to digital technologies. Previous studies already identified higher demands on mathematical/statistical skills in businesses that were active in digitalisation.<sup>16</sup>

Finally, innovators also mention foreign language skills more often than non-innovators (3 vs. 1%). This likely has to do with the fact that innovators are more active in international markets, including in procurement, for example, which makes foreign language skills more important for these businesses.<sup>17</sup> However, with mentions of 3 and 1%, foreign language skills are the recruitment problems reported least often.

## Conclusion

### Key findings

The problems small and medium-sized enterprises encounter in filling vacant positions have grown significantly in the past decade. Innovators, in particular, are currently most affected – at a high rate of 52%. The largest barriers to filling vacancies are lack of applicants and high salary demands. Both aspects can be directly attributed to the general shortage of skilled labour and play an almost equally important role in innovative and non-innovative enterprises. And there are hardly any differences between innovators and non-innovators with respect to other factors that determine the attractiveness of vacant positions.

On the other hand, there are significant differences in the requirements employers place on applicants' qualifications. Particularly with respect to social skills, digital skills and mathematical/statistical abilities, innovative businesses find that their requirements remain unfulfilled more often than other enterprises. This is likely due to the fact that innovators require their workforce to have higher skills in these fields because they use more advanced technologies and have a more modern work and business organisation. The demands of their innovation processes can also result in a higher need for the skills mentioned.

Thus, the recruitment problems of innovators are very similar to those of companies that are pushing ahead with their digitalisation. The reason for this is that innovation and digitalisation are closely linked at project level, and that both activities are also heavily concentrated in similar types of enterprises.

There is hope from a recent study which found that in the past decade, enterprises have increasingly taken steps to adopt targeted measures aimed at securing their supply of skilled labour in line with their specific requirements and circumstances. Innovative enterprises in particular are focusing heavily on investing in the skills of their workforce and (to a lesser extent) on measures aimed at reducing their skilled labour needs.<sup>18</sup>

### Conclusions for economic policy

It is unlikely, however, that businesses will be able to solve all of their recruitment problems on their own. Rather, it appears necessary to further expand economic and education policy measures aimed at mitigating the skilled labour shortage.

The broad shortage of applicants is the most frequent barrier to filling vacancies in both innovative and non-innovative enterprises. Measures that have the potential to reduce the skills shortage include activating domestic labour force potential (e.g. women and older workers), empowering a higher number of young people to engage in vocational training, upskilling unskilled or semi-skilled unemployed people, and stepping up efforts to promote continuing education in order to keep the qualifications of the workforce up-to-date, as well as increasing the targeted migration of workers who have on-demand skills.<sup>19</sup> Current studies confirm the high potential that lies in immigration. Thus, 76% of male refugees who remain in Germany for seven years or longer have a job.<sup>20</sup> Already four years after entering the country, more than 60% of refugees who have work are employed as skilled workers.<sup>21</sup>

Specific measures for addressing the needs of innovative businesses apply to soft skills and digital skills as well as mathematical/statistical abilities. With regard to digital skills, one angle of attack is to mitigate the shortage of IT specialists. IT experts with a university degree are in particularly short supply.<sup>22</sup> More young people need to be motivated to study information technology and the dropout rate needs to be reduced. One approach is to attract more female students, since the share of female students of computer science still sits at only 20%.<sup>23</sup>

At the same time, there is a need to improve digital skills across the broad workforce. One way of achieving this is to more closely integrate digital content in school, vocational and academic curricula. Germany lags behind other countries in the teaching of digital skills in schools<sup>24</sup> and only around half of tertiary students possess the required digital skills at the end of their degree course.<sup>25</sup>

One approach to increasing digital skills in the workforce is to improve the continuing education activities that collapsed during the COVID-19 pandemic<sup>26</sup>. High costs incurred from workplace absence and the costs of the training measures themselves – and, from an employer's perspective, the loss of income resulting from extended training measures – stand in the way of continuing education measures.<sup>27</sup> Furthermore, inadequacies in the certification of qualifications and difficulties in navigating and assuring quality in the confusing training market are barriers that need to be taken seriously.<sup>28</sup>

Mathematical/statistical abilities are key skills that need to be acquired primarily at school. The results of the PISA studies are therefore alarming. After the mathematical skills of students improved between 2003 and 2012, the average performance of students in Germany has since been on the decline again. What is also noteworthy is the wide gulf between students from privileged socio-economic backgrounds and those from socio-economically disadvantaged groups. What also likely plays a role in the skilled labour shortage, particularly in innovative businesses, is that the scientific knowledge of German students has also decreased since the 2012 study.<sup>29</sup>

The unsatisfactory social skills of applicants are also a larger recruitment obstacle for innovators than for other businesses. This is probably due to the fact that innovative businesses place high demands on the social skills of their employees because of their role as trailblazers in the structural transformation and the requirements of their innovation processes.

With respect to the three specific skills requirements of innovative businesses that were identified in this study, the further development of social skills is likely to be the most complex task. This is because a person's social skills are influenced by a wide range of factors from early childhood onward. But it is considered that social skills can be learned – unlike intelligence, for example.<sup>30</sup> That is why school education is deemed to be of crucial importance for improving social skills.<sup>31</sup> As different occupational profiles require different social skills, the way in which vocational training and academic education are designed is also important for imparting appropriate social skills. Academic education in particular is deemed to concentrate too much on imparting problem-solving skills.<sup>32</sup> The necessary skills need to be taught as part



of the curricula in the future. But in order for this to be successfully implemented, further research work will need to be undertaken in order to define social skills with greater precision and, in this way, enable targeted support to be provided in this area.<sup>33</sup>

### Investigative methodology

The statistical analysis was based on the 20th survey wave of the KfW SME Panel, which was conducted in the spring of 2022. The analysis of the reasons for recruitment problems was undertaken with the aid of probit models in which the reasons for the expected recruitment problems represented the variable to be explained in each case. The following attributes were used in these analyses as explanatory variables: size of enterprise (in full-time equivalents), age of enterprise, employment of university graduates, share of employees under the age of 40, extent to which the enterprise carried out innovation and digitalisation projects, sales region, collective industry to which it belongs, degree of settlement density of the district of its registered office, legal status, KfW support status, group to which it belongs and

region of its registered office. The survey covered responses from around 5,000 businesses that had recruitment problems.

The regression results are illustrated using model calculations for a typical small or medium-sized enterprise. The influence of an attribute on the target values can be illustrated by varying the relevant parameter in the model calculations while maintaining all other business parameters unchanged.

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<sup>1</sup> Cf. Ulku, H. (2004): R&D, Innovation, and Economic Growth: An empirical Analysis, IMF Working Paper 04/195; OECD (2007) (Ed.): Innovation and Growth. Rationale for an Innovation Strategy (<https://www.oecd.org/edu/ceii/40908171.pdf>), retrieved on 16 June 2016, or Westmore, B. (2013): R&D, Patenting and Growth: The Role of Public Policy, OECD Economics Department Working Papers, No. 1047, OECD Publishing, Paris or Dachs, B., Hud, M., Koehler, C. and Peters, B. (2017): Innovation, Creative Destruction and Structural Change: Firm-level Evidence from European Countries, *Industry and Innovation* 2(4):346–381.

<sup>2</sup> Cf. Bravo-Biosca, A.; Marston, L.; Mettler, A.; Mulgan, G. and Westlake, S. (2013), Plan I – Innovation for Europe, Nesta and the Lisbon Council.

<sup>3</sup> Cf. Müller, M. (2023): Skills shortage marks a turning point: The times of guaranteed growth are over, *Focus on Economics* No. 414, KfW Research or for example Hickmann, H. and Malin, L. (2022): Fachkräftereport März 2022 – offene Stellen und Fachkräftelücke auf Rekordniveau (*Skilled Labour Report March 2022 – vacancies and skills shortages on record level – our title translation*, in German), KOFA Kompakt 4/2022, Kompetenzzentrum Fachkräftesicherung, German Economic Institute, Cologne.

<sup>4</sup> Cf. Müller, M. (2023): Weak business cycle reduces skilled labour shortages – challenge remains, KfW-ifo Skilled Labour Barometer, December 2023, KfW Research.

<sup>5</sup> Cf. Tiedemann, J. and Malin, L. (2023): Jahresrückblick 2022 Fachkräftesituation angespannter denn je (*Annual Review 2022 skilled labour situation more tense than ever – our title translation*, in German), KOFA Kompakt 2/2023, Kompetenzzentrum Fachkräftesicherung, German Economic Institute, Cologne.

<sup>6</sup> Cf. skills shortages among SMEs and action taken by businesses: Zimmermann, V. (2023): Mittelständische Unternehmen setzen auf Qualifizierung und allgemeine personalpolitische Maßnahmen zur Sicherung des Fachkräftebedarfs (SMEs focus on training and general HR policy measures to meet their skilled labour needs – in German only) *Focus on Economics* No. 445, KfW Research.

<sup>7</sup> Cf. Zimmermann, V. (2014): Innovation und Beschäftigung. Die Beschäftigungswirkung verschiedener Arten von Innovationen in expandierenden und schrumpfenden mittelständischen Unternehmen (*Employment and innovation. The employment effect of different types of innovation in expanding and contracting SMEs – our title translation*, in German), *Journal of Business Economics*, Special Issue 4/2013: p. 131–149. and Zimmermann, V. (2009), The Impact of Innovation on Employment in Small and Medium Enterprises with Different Growth Rates. *Jahrbücher für Nationalökonomie und Statistik* 229 (1+2), p. 313–326.

<sup>8</sup> The identified differences are not statistically significant.

<sup>9</sup> This difference, too, is not statistically significant.

<sup>10</sup> Cf. Bachmann, R. et al. (2021): Veränderungen von Tätigkeitsprofilen im Zuge des digitalen Wandels in Deutschland, Studie zum deutschen Innovationsystem Nr. 9-2021 (*Changes of job profiles in the course of the digital transformation in Germany, study on the German innovation system No. 9-2021 – our title translation*, in German).

<sup>11</sup> Cf. Zimmermann, V. and Thomä, J.: (2019): Interactive learning or R&D: How do small and medium-sized enterprises generate innovations? *Focus on Economics* No. 264, KfW Research or Jensen, M. B., Johnson, B., Lorenz, E. and Lundvall, B. A. (2007): Forms of knowledge and modes of innovation. *Research Policy* 36(5): 680–693.

<sup>12</sup> Cf. Zimmermann, V. (2022): SMEs that have a digitalisation strategy are more proactive in their digital evolution, *Focus on Economics* No. 387, KfW Research.

<sup>13</sup> Cf. Zimmermann, V. (2021): Innovation and digitalisation in enterprises mutually reinforce each other, *Focus on Economics* No. 338, KfW Research.

<sup>14</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 – Formation – Development Perspectives – our title translation*, in German). Springer, Gabler Verlag.

<sup>15</sup> Cf. Bachmann, R. et al. (2021): Veränderungen von Tätigkeitsprofilen im Zuge des digitalen Wandels in Deutschland, Studie zum deutschen Innovationsystem Nr. 9-2021 (*Changes of job profiles in the course of the digital transformation in Germany, study on the German innovation system No. 9-2021 – our title translation*, in German).

<sup>16</sup> Cf. Zimmermann, V. (2023): Fehlende Digitalkompetenzen erschweren die Besetzung offener Stellen in digital aktiven Unternehmen (Shortage of digital skills makes it difficult for digitally active firms to fill vacancies – in German only), *Focus on Economics* No. 420, KfW Research.

<sup>17</sup> Cf. Zimmermann, V. (2018): Determinants of digitalisation and innovation behaviour in the SME sector, *Focus on Economics* No. 236, KfW Research.

<sup>18</sup> Cf. Zimmermann, V. (2023): Mittelständische Unternehmen setzen auf Qualifizierung und allgemeine personalpolitische Maßnahmen zur Sicherung des Fachkräftebedarfs (SMEs focus on training and general HR policy measures to meet their skilled labour needs – in German only) *Focus on Economics* No. 445, KfW Research.

<sup>19</sup> Cf. Zimmermann, V. (2023): Mittelständische Unternehmen setzen auf Qualifizierung und allgemeine personalpolitische Maßnahmen zur Sicherung des Fachkräftebedarfs (SMEs focus on training and general HR policy measures to meet their skilled labour needs – in German only) *Focus on Economics* No. 445, KfW Research.

<sup>20</sup> Cf. Brückner, H. et al. (2023): Erwerbstätigkeit und Löhne von Geflüchteten steigen deutlich (*Employment and wages of refugees rise significantly – our title translation*, in German), IAB-Kurzbericht 13/2023.

- <sup>21</sup> Cf. Liebau, E. (2023): Geflüchtete in Deutschland arbeiten zunehmend – auch als Fachkräfte (*More and more refugees in Germany are working – and as skilled workers* – our title translation, in German), DIW Weekly Report 48/2023, p. 664–670.
- <sup>22</sup> Cf. Flake, R. et al. (2023): Fachkräftemangel in IT-Berufen – Gute Chancen für Auf- und Quereinsteiger:innen (*Skills shortages in IT professions – good opportunities for rising professionals and career changers* – our title translation, in German), KOFA Kompakt 4/2023, German Economic Institute, Cologne.
- <sup>23</sup> Cf. <https://de.statista.com/statistik/daten/studie/732331/umfrage/studierende-im-fach-informatik-in-deutschland-nach-geschlecht/> – last retrieved on 9 November 2023.
- <sup>24</sup> Cf. Suessenbach, F. et al. (2023): Informatikunterricht: Deutschland abgehängt in Europa (IT skills teaching: Germany is left behind in Europe – our title translation, in German), Policy Paper edition 1 (January 2023, Stifterverband and Heinz Nixdorf Stiftung).
- <sup>25</sup> Cf. Senkbeil, M. et al. (2019), Wie gut sind angehende und fortgeschrittene Studierende auf das Leben und Arbeiten in der digitalen Welt vorbereitet? Ergebnisse eines Standard-Setting-Verfahrens zur Beschreibung von ICT-bezogenen Kompetenzniveaus (*How well are beginner and advanced students prepared for life and work in the digital world? Findings of a standard-setting procedure to describe ICT-related skill levels* – our title translation, in German), Zeitschrift für Erziehungswissenschaft, 22, p. 1359–1384.
- <sup>26</sup> Cf. Leifels, A. (2021): Weiterbildung bricht in der Krise ein – Bedarf an Digitalkompetenzen wächst (*Continuing education drops during the crisis – digital skills needs are growing* – in German), Focus on Economics No. 329, KfW Research.
- <sup>27</sup> Cf. Leifels, A. (2022): Weiterbildung nur bei gut einem Drittel der KMU – neue Weiterbildungskultur nötig (*Only a good one third of SMEs engage in professional development – we need a new continuing education culture* – in German), Focus on Economics No. 362, KfW Research.
- <sup>28</sup> Cf. Leifels, A. (2021): German SMEs lack digital skills, need more training, Focus on Economics No. 346, KfW Research.
- <sup>29</sup> PISA 2022. Analyse der Bildungsergebnisse in Deutschland. Zusammenfassung (*Analysis of educational results in Germany. Summary* – our title translation, in German) and OECD (Hrsg.) (2019): Programme for international student assessment (PISA) PISA 2018 results, country note Germany.
- <sup>30</sup> Cf. Tschöpe, T. et al. (2016): Modellierung und Messung sozialer Kompetenzen – Zugänge aus der Bildungsforschung (*Modelling and measurement of social skills – findings from educational research* – our title translation, in German), BWP 2/2016, p. 45–49.
- <sup>31</sup> Cf. Bachmann, R. et al. (2021): Veränderungen von Tätigkeitsprofilen im Zuge des digitalen Wandels in Deutschland, Studie zum deutschen Innovationsystem Nr. 9-2021 (*Changes of job profiles in the course of the digital transformation in Germany, study on the German innovation system No. 9-2021* – our title translation, in German).
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