Use of Digital Technologies for HR Management in Germany: Survey Evidence*

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May 1, 2023

Abstract

Using a survey with 57 German firms, we evaluate the level of digitalization of the human resource management (HRM) function and document perceived benefits and barriers of technology adoption from organizational and individual users' perspectives. The results give reason for optimism. Most of the companies report that the core HR processes are digitized. We do not observe adverse effects of the digital HRM tools on users' job satisfaction and work stress. Still, more than half of companies do not yet use digital tools for strategic HRM decisions. Respondents appreciate the increased speed and cost-efficiency of digital HR processes and associate them with a competitive advantage in talent acquisition. The most prominent barriers to adoption are lack of qualified professionals, high costs, and uncertainty regarding the legal framework. Additionally, we test whether small and medium-sized enterprises differ systematically from larger organizations in how they use digital HRM tools.

Keywords: digital HRM tools, human resource management, digitalization, Germany

JEL Classification: M12, M15, M50, O33, O52

*The authors gratefully acknowledge support by DFG CRC TRR 190.

1 Introduction

Interest in digitalization is high among practitioners, policymakers and academic researchers. As technological advances drive economic growth (Solow 1957, Stiroh 2001), high hopes are connected with digitalization and digital transformation. Digital technologies have dramatically transformed production and other business processes already. Recent breakthroughs in artificial intelligence (AI) and machine learning (ML) accelerate this change. One of the important business functions where digital technologies are commonly used is human resource management (HRM): According to a recent survey among U.S. companies (Zolas et al. 2021), human resource management is the second most digitized (where the data is stored in a digital format) business function after finance in companies across all industries. In addition, information technologies open up new opportunities for strategic HR management and can help companies select, train, and retain talents. In fact, there is ample academic evidence that digital tools in HR can be of great benefit at both operational and strategic levels. For example, the incorporation of technical tools into HR operations, such as workforce planning, has been practiced for many years (Lesaint et al. 2000). More recently, companies have started to use algorithmic suggestions with the goal of improving the quality of hires (Cowgill 2018, Hoffman et al. 2018).

The use of digital tools in HR management varies among the companies. As conceptually analyzed by Strohmeier (2020), companies may find themselves at different stages from completely non-digital to fully digital organizations. This paper aims to document the state of digitalization of companies in Germany, with a particular focus on the use of digital technologies in the HR function. We focus on the HR function due to the importance of human capital to the overall economic success of a company (Stiles & Kulvisaechana 2003). In a survey of 57 German companies, we address the frequently suggested mismatch between Germany's leading economic role and its average levels of digitalization.[1]

The aim of this paper is threefold. First, we assess the current levels of digitalization of the various HR functions. Second, we document how the use of digital tools can help companies to attract new talents. Third, we explore what benefits and barriers drive or hinder the adoption of technology from both a company and a user (i.e., HR professionals') perspective. Additionally, we capture the prospects of digital HRM tools being adopted. Throughout the study, we differentiate between small and medium-sized enterprises (SMEs) and large firms to determine whether there are systematic differences between them. Our interest in SMEs is driven by the special focus of policymakers for the digitalizaton of companies of this type, for instance, through the Federal Ministry of Economic Affairs and Energy's initiative "SMEs Digital" and its excellence clusters.[2]

[1] Although the topic of digitalization has an important role in public and political discussion in Germany, in 2020 the country scored only slightly above EU average on the Digital Economy and Society Index (see `https://digital-strategy.ec.europa.eu/en/policies/desi`).

[2] `https://www.bmwi.de/Redaktion/EN/Publikationen/Mittelstand/smes-digital-strategies-for-digital-transformation.pdf?__blob=publicationFile&v=4`

Several important observations emerge. First, while 74% of companies indicate that at least the most important business processes are digitalized, the use of People Analytics and AI- or ML-based digital tools in HR management is limited. That is, only few companies use digital data to generate insights. Second, while our survey does not reveal a causal relationship, it is noteworthy that companies that use digital tools for more functions have less difficulty filling open positions than those that are less digitalized. Third, we observe that companies acknowledge the benefits of adopting advanced and digital HRM tools. Yet, high costs, lack of HR professionals with digital skills, and uncertainties related to the regulatory framework seem to be the main barriers to adoption. Image concerns are also among the major barriers to adoption, with respondents fearing that digital HRM tools could make employees feel constantly monitored. Companies using digital HRM tools are particularly optimistic about the benefits and less concerned about the barriers. SMEs largely face similar barriers as large companies. In contrast to findings that increased use of information and communication technology (and thus digital tools) can lead to "technostress" and anxiety (Tarafdar et al. 2007), our respondents do not report lower work satisfaction related to the use of digital tools.

The paper proceeds as follows: In Section 2, we describe the procedure and characterize our sample. In Section 3, we document the results. Section 4 closes with an outlook and discussion.

2 Procedures

We conducted an anonymous online survey among executives of German organizations in February 2021. The survey was distributed via the professional network LinkedIn (N=25) as well as via the Prolific Academic platform (N=32). Respondents recruited via Prolific Academic were pre-screened to have a managerial role and received a £2 reimbursement in line with remuneration rules of the platform. The median duration of the survey was 13 minutes.[3]

The survey included questions about current use of digital tools in the organization, plans for adopting such tools in the future, benefits of and barriers to using digital tools in HR management, and the impact of the use of digital tools on direct users. Additionally, organizational and control characteristics of the companies and the respondents were collected. The questions with particular focus on HR practices were only presented to respondents who indicated that they were involved in HR decisions (n=48).[4]

The average age of the respondents was 37 years (SD=9). About 70% of them were male. Of all respondents, 25% were HR professionals, 19% IT professionals, and 18% marketing and sales professionals. Companies represent a variety of industries, primarily IT and telecommunications (29%), banking (15%), and media

[3]The study involved a survey of a non-vulnerable population. Participants gave written consent before taking part in the survey and could leave the survey at any time. The respondents remained anonymous and no personal data was collected. The risks and psychological stress from the study are unlikely to be larger than from routine use of the computer. Therefore the study is eligible for self-certification and does not require an additional ethics approval.

[4]The English translation of the survey can be found here: `shorturl.at/jyCFG`

(7%). Around 55% of the respondents work in companies with more than a thousand employees, including 32% of the total sample who work in companies with more than 10,000 employees worldwide. 16 companies can be classified as SMEs, namely, they have revenues of less than 50 million Euro and fewer than 250 employees. 16% of respondents report that their company has its headquarters outside Germany and 56% that it has a subsidiary abroad. Around 40% of respondents worked at publicly traded companies, and 20% at family-owned firms. While our sample may not be fully representative of the entire German economy, it can still provide valuable insights into the attitudes towards adoption of digital technology in HR. However, it is important to keep in mind that our results might be subject to sampling bias in that they reflect the views of more experienced and advanced users.

The median respondent started working at his or her current company in 2016. About half of the companies reported outsourcing some of their HR processes to external providers. Based on the descriptive statistics above, we can conclude that our sample, while not representative of the universe of German companies, does include establishments with various characteristics and thus our findings are not limited to, e.g., a single industry or big companies only. In further analysis, we are able to consider differences between SMEs and larger companies.

3 Results

We begin our analysis by assessing the digitalization of business processes in general and the HR function in particular. Next, we focus our attention on the interaction between digital HR practices and talent acquisition. We then analyze the barriers to and benefits of using digital HRM tools and their impact on direct users.

3.1 Adoption of Digital HRM Tools

To measure the overall level of digitalization among the organizations in our sample, we ask about digital storage of data (on a scale from "we use only analog data" to "all data is stored in digital format"; henceforth, degree of *digitization*) and the digitalization of business processes (on a scale from "none of the processes is digitalized" over "all key processes are digitalized" to "all processes and tasks are digitalized"; henceforth, degree of *digitalization*).[5] We find that the majority of companies report relatively high levels of digitization and digitalization: 70% of organizations store *most* or *all* information digitally, and 61% of organizations have digitalized most or all processes and tasks, with an additional 12% of companies performing all *key* tasks and processes digitally. The degree of digitalization of business processes and tasks is highly correlated with the degree of digitization (Pearson's $r = 0.82$, $p < 0.01$; see Table 1).

[5]For the exact wording of the questions see questions Q1-2 and Q1-3 `http://shorturl.at/jyCFG`.

By analogy with the overall organizational degree of digitization and digitalization, we examine the prevalence and depth of the use of digital technologies in HR management. We focus on the three following applications of digital technology in HR management, in order of increasing degree of digitalization: digital communication, data-driven approaches (e.g., People Analytics, Big Data), and advanced digital solutions (e.g., artificial intelligence, machine learning, algorithmic forecasting).

Digital data (i.e., data storage and data exchange) can be seen as a first and necessary step towards the digitalization of processes and the introduction of advanced digital tools for (digital) value creation in companies. Similarly, digital communication can be considered as the elementary level of digitalization, as it is undoubtedly prevalent in a variety of digital processes. However, in order to achieve a positive impact of digital technologies on the economic activities of companies, comprehensive data analysis is required to transform data into insights and initiate data-driven strategic decisions.[6] Therefore, we dive deeper by focusing on data-driven analytical approaches, such as People (or HR) Analytics. Finally, we complement this "nucleus of a digital HR strategy" (Strohmeier 2020) with advanced digital technologies of the new generation: algorithmic forecasting, AI and, ML, and survey the use of advanced digital HRM tools. This approach results in a multi-faceted assessment of the adoption of these digital tools.

We find that almost 90% of organizations use digital communication tools for their HR management. However, the penetration of *data-driven* and *advanced* digital tools is rather low: Fewer than 40% of companies regularly apply data-driven digital approaches such as People Analytics in their HRM. About the same percentage of companies (37%) employ advanced digital HRM tools using technologies such as AI, MLg, and algorithmic forecasting. Overall, 44% of organizations use at least one of these digital value-creation approaches. Those implementing data-driven HR approaches report higher overall degrees of digitization and digitalization (Pearson's r are 0.52 and 0.49, both $p < 0.01$; see Table 1). Whereas the use of advanced digital HRM tools is also positively associated with degree of digitization or digitalization (Pearson's r are 0.342 and 0.382, both $p < 0.01$), it is even more strongly correlated with the implementation of data-driven HR approaches (Pearson's $r = 0.655$, $p < 0.01$). Indeed, fewer than 15% of companies using advanced digital HRM tools do not report using the data-driven HR approach. These findings suggest that a data-driven HR approach – such as People Analytics – is an initial step towards the digital transformation of HR management, followed by the use of more advanced technologies.

Result 1. (a) 70% of all organizations surveyed manage their data mostly or fully digitally. 61% of organizations have predominantly digital business processes. (b) 90% communicate widely digitally. (c) However, more than half (56%) do not use data-driven or AI-based digital tools in the domain of HR management.

[6] As suggested by Strohmeier (2020), one of the potential contributions of digital HRM to business value creation is to enable data-driven decisions.

Table 1: Means and pairwise correlations: Digitalization of business processes

Variables		Mean	Std. Dev.	(1)	(2)	(3)	(4)	(5)
(1)	Digital data storage (digitization)	3.772	1.035	1.000				
(2)	Digital processes (digitalization)	3.491	1.088	0.815***	1.000			
(3)	Digital communication in HR	4.579	.963	0.296**	0.252*	1.000		
(4)	Data-driven approach in HR	3.054	1.367	0.520***	0.492***	0.292**	1.000	
(5)	Advanced technologies in HR	2.614	1.411	0.342***	0.382***	0.312**	0.656***	1.000

Notes: The underlying questions were: (1) "To what extent is information managed digitally in your company?" from 1 "the company only uses analog data" to 5 "all data is stored in a digital format". (2) "How would you describe the level of digitalization for processes in your company? from 1 "none of the processes and tasks are digitalized" to 5 "all processes and tasks are digitalized". (3), (4), (5) "How widespread is the use of the following approaches to human resources management within your company?" with 1 corresponding to "not common at all" to 5 corresponding to "very common" (the original scale used in the survey was reversed).
*** p<0.01, ** p<0.05, * p<0.1

Now we turn to specific HR processes and subfunctions. In particular, the survey respondents were asked about the following HR processes and their degree of digitalization: job advertisement, applications screening, recruitment interviews, ability and personality tests, on-boarding of new employees, talent development (e.g., career planning, training), workforce forecasting & planning, compensation & benefits, employee retention management, compliance systems, internal communication, HR-controlling, People Analytics (as a function), and administrative tasks.[7] We find that digital technologies are used in a wide range of HR management processes: The digitalization degree of the most of the processes lies above the half-way response of three points (on a scale from 1 "not digital at all" to 5 "completely digital"; see Table A1 for p-values) and the difference to the midpoint of the scale is statistically significant except for talent development ($M = 3.31$, $SD = 1.35$), ability and personality tests ($M = 3.26$, $SD = 1.42$), retention management ($M = 3.05$, $SD = 1.21$), and recruitment interviews ($M = 3$, $SD = 1.27$). The share of companies stating that their HR processes are fully or predominantly digital is the highest for job postings: 70% of companies compose and publish their vacancies in a completely or predominantly digital way. This is followed by digital internal communication (53%), workforce planning and forecasting (47%), HR-controlling (46%), compensation & benefits (46%), and administrative tasks (46%). The average degree of digitalization of ten out of 14 HR processes surveyed seems to be lower among SMEs than among large organizations. The percentage of companies with fully or predominantly digital HR processes is also lower among SMEs compared to large companies for most of the HR processes in the list (see Panel A in Table 2 and Table A1 in the Appendix for more details). However, with one exception for compliance systems, the difference is not statistically significant.

Result 2. (a) Around 82% of organizations stated that they handle at least one of the HR processes we examine in the survey completely or predominantly digitally. (b) Of all HR processes, job advertisement is by far the most digitalized process. (c) Some HR processes of SMEs are slightly less digital than those of

[7]Not all respondents answered all questions, resulting in some missing observations for some of the categories. To be conservative, we report percentages based on the entire sample, assuming that missing values correspond to non-use of digital technology in the respective category.

large enterprises, but the difference is not statistically significant for the majority of processes.

We also survey the use of advanced digital solutions for each subprocess (henceforth, *advanced digital HRM tools*).[8] Panel B in Table 2 summarizes the use of advanced digital HRM tools. In line with the recent findings of Zolas et al. (2021), we observe a meaningful gap between the spread of digitalization and its depth: A lower share of organizations reports using advanced digital HRM tools as compared to the share of organizations that report having predominantly or fully digital HR process. Only a fraction of the companies that report a certain process to be predominantly or fully digitalized also report using advanced digital HRM tools.

Most frequently, the advanced digital HRM tools are used for ability and personality tests (30%), followed by People Analytics, applications screening, and personnel planning (each at about 16%). Out of 22 organizations that rely predominantly or entirely on digital ability and personality testing, 55% report using AI-based tools for this purpose. At the same time, around one-third of organizations with digital processes of People Analytics or applications screening apply advanced digital HRM tools. Overall, 42% of respondents use advanced digital technologies for at least one of the HR processes surveyed. 56% of SMEs and 34% of large enterprises report not using any of advanced digital HRM tools. However, this difference is not statistically significant ($p = 0.132$, $\chi^2(1) = 2.27$). Interestingly, some companies report that they are using VR and AR technologies for personality testing (14%) and talent development measures (9%).

Result 3. (a) The most common use of advanced digital HRM tools is for ability and personality testing. (b) One-third of organizations that screen their applicants digitally or use People Analytics apply advanced digital HRM tools.

3.2 Digitalization and Talent Acquisition

Digitalization is likely to change the talent mix of a company's workforce (Dixon et al. 2021). Digitalization may increase demand for workers with digital expertise, making talent acquisition more difficult, especially when the supply of digital skills is scarce (Bresnahan et al. 2002). At the same time, digitalization can increase organizational efficiency through automated and timely decision-making, as well as through better management practices and more effective workforce planning (e.g., Hoffman et al. 2018, Lesaint et al. 2000). In addition, digital HRM tools can accelerate the search for new talent and improve the efficiency of the talent acquisition process (Li et al. 2020). Our survey does not allow us to capture employment trends among the surveyed companies. However, we do measure the severity and direction of the issues companies may face in filling their open positions. Namely, we ask on a 5-point Likert scale how difficult it is to fill job

[8] As this term might be interpreted very broadly, we provide respondents with the following examples of "advanced digital solutions": Artificial Intelligence, Deep Learning, Machine Learning, Natural Language Processing or algorithms in general.

Table 2: Share of companies using digital tools in HR processes

HR Process		Panel A: Fully or predominantly digital				Panel B: Advanced digital HRM tools				
		Total N=57	Large enterprises N=38	Diff.	SMEs N=16	Total N=57	Digital only N varies by a process	Large enterprises N=38	Diff.	SMEs N=16
(1)	Job advertisement	0.70	0.66	<	0.88	0.12	0.15	0.13	>	0.06
(2)	Internal communication	0.53	0.53	<	0.56	0.07	0.03	0.05	<	0.13
(3)	Compensation & benefits	0.49	0.55	>	0.38	0.07	0.14	0.08	>	0.06
(4)	Workforce forecasting & planning	0.47	0.55	>	0.31	0.16	0.26	0.18	>	0.06
(5)	HR-controlling	0.46	0.53	>	0.31	0.14	0.23	0.13	>	0.13
(6)	Administrative tasks	0.46	0.50	>	0.44	0.11	0.15	0.11	>	0.06
(7)	Compliance systems	0.42	0.55	>**	0.19	0.07	0.04	0.05	<	0.13
(8)	Applications screening	0.42	0.42	<	0.50	0.16	0.33	0.18	>	0.06
(9)	Talent development	0.40	0.42	>	0.38	0.14	0.22	0.16	>	0.13
(10)	On-boarding	0.40	0.39	<	0.50	0.09	0.09	0.08	>	0.06
(11)	Ability & personality tests	0.39	0.39	>	0.38	0.30	.55	0.32	>	0.25
(12)	People Analytics	0.37	0.39	>	0.31	0.16	0.39	0.18	>	0.06
(13)	Recruitment interviews	0.33	0.32	<	0.44	0.11	0.26	0.08	<	0.19
(14)	Retention management	0.25	0.26	>	0.25	0.05	0.07	0.05	<	0.06

Notes: Three companies have not reported their annual revenues. Therefore, they are not included in the analysis by company size. The subsample "Digital only" includes only companies that reported having a predominantly or fully digital HR process. Its size varies among lines of the table. Statistically significant differences between large and small and medium-sized enterprises are indicated by ** for $p < 0.05$ (2-sided Chi-squared test $p = 0.014$, $\chi^2(1) = 6.08$).

openings. 54% of respondents agree that it is difficult or somewhat difficult for their company to fill vacant positions.

To consider possible relationships between the use of digital technologies and talent acquisition, we conduct a regression analysis with the dependent variable "difficulty in acquiring talent" (on a 5-point Likert scale with 5 indicating severe difficulty in talent acquisition, $M = 3.11$, $SD = 1.22$) and various digitalization measurements as independent variables. We also control for companies' characteristics (such as company size, industry, ownership structure, revenue, average age of workforce). The standardized coefficients of the regression analysis are shown in Table 3.[9] As can be inferred from the size of the regression coefficients, an increase by one standard deviation of an independent variable is associated with a reduction of the difficulty in talent acquisition by 0.31 - 0.38 of a standard deviation. In general, companies with a higher degree of digitalization of their business processes report less severe challenges in filling vacancies (OLS-coefficient $\beta = -0.32$, $p = 0.028$, model(1)). Similarly, greater use of a data-driven approach in HR (such as People Analytics, workforce planning, HR-controlling) is associated with easier talent acquisition ($\beta = -0.33$, $p = 0.022$, model (2)). Also, the use of *advanced digital HRM tools* is associated with easier recruitment of new talent ($\beta = -0.32$, $p = 0.036$, model (3)). Companies that report a higher degree of digitalization in job advertisement also report that filling vacancies is less difficult ($\beta = -0.31$, $p = 0.038$, model (4)). Digital

[9]For ease of interpretation, we use OLS estimation in the regression analysis. Ordered probit estimations have virtually not changed the results; if anything, the estimators become more statistically significant. The results of the ordered probit estimations are reported in the Appendix; see Table A2 and Table A5.

workforce planning is also associated with fewer difficulties in talent acquisition ($\beta = -0.38$, $p = 0.013$, model (5)). However, we observe no significant association between the use of advanced digital tools in any particular HR process and difficulty in filling new positions.

Result 4. (a) A higher level of digitalization is associated with less difficulty in filling open positions. (b) Organizations that apply data-driven HRM approaches or advanced digital HRM tools report having less difficulty in the search for new talent. However, we do not find any evidence regarding the effectiveness of the specific digital HRM tools except for *digital job advertisement* and *digital workforce forecasting and planning,* which are correlated with easier talent acquisition.

Table 3: OLS-regression analysis: Digitalization and difficulties in acquiring talent

Model	Independent variable (standardized)	Coef.	Robust SE	N	Adjusted R^2
(1)	Digitalization of business processes	-0.319**	0.140	51	0.206
(2)	Use of data-driven approaches in HR	-0.325**	0.136	50	0.275
(3)	Use of advanced digital HRM tools	-0.322**	0.148	51	0.213
(4)	Digitalization of job advertisement	-0.313**	0.145	44	0.130
(5)	Digitalization of workforce planning	-0.381**	0.145	41	0.194

Notes: This table reports OLS coefficients and robust standard errors. All variables are standardized. The dependent variable *Difficulty in acquiring talent*, measured as agreement with the statement "It is challenging for our company to fill vacancies" on a 5-point Likert scale with 1 corresponding to "strongly disagree" and 5 to "strongly agree" ($M = 3.11$, $SD = 1.22$). The main independent variables vary across models and are named in the second column. In model (1), it is the degree of digitalization of (all) business processes. It is measured on a 5-point Likert scale with 5 indicating highest degree of digitalization ($M = 3.63$, $SD = 1.02$). In model (2) the independent variable is the use of data-driven approaches in HR management ($M = 3.24$, $SD = 1.27$). Model (3) controls for the use of advanced digital HRM tools. These variables are elicited on a 5-point Likert scale with 5 corresponding to "very widespread use" and 1 to "no use" ($M = 2,69$, $SD = 1.42$). In models (4) to (5), the main independent variables capture the degree of digitalization of HR processes such as job announcements ($M = 4.39$, $SD = 0.75$), and workforce planning and forecasting ($M = 3.51$, $SD = 1.14$). These two variables are asked about on a 5-point Likert scale with 5 corresponding to "fully digital" and 1 to "not digital at all". In all models, we control for company size, industry, ownership structure, revenues, and the average age of the workforce. Adding controls for increasing and decreasing number of employees from 2018 to 2019 does not change results.
*** p<0.01, ** p<0.05, * p<0.1

We also asked about the biggest obstacles companies face in filling open positions. Respondents could name the key challenges they face by selecting one or more options from the following list: (i) too few applications; (ii) lack of general skills among applicants; (iii) lack of specific skills among applicants; (iv) selected candidates often reject the offer; (v) other (to be specified). The companies experiencing difficulties in talent acquisition (n=30) gave lack of specific skills among applicants as the most prevalent reason (88%), followed by lack of general skills (40%) and too few applications (33%). Among those experiencing difficulties in talent acquisition, companies with a higher degree of digitalization in their business processes are more likely to report lack of specific skills among applicants (marginal effect corresponds to 13 percentage points, $\beta = 0.13$, $p = 0.061$, probit regression controlling for companies' size; see Table A3). That is, companies with a higher degree of digitalization are less likely to have problems in filling positions, but if they do, the major difficulty is usually candidates' lack of specific skills. The companies that use digital job advertisements more extensively are more likely to mention a low number of applications as the main difficulty for filling vacancies

(again we consider only companies that reported having difficulties; marginal effect of 26 percentage points, $\beta = 0.26$, $p = 0.034$). This suggests that the extensive use of digital job postings may be driven by negative experiences in obtaining a sufficient number of applications. When considering the results of this subsection, it is important to keep in mind that these are merely associations. We cannot claim causal effects due to omitted unobserved characteristics or reversed causality. For example, more highly digitalized companies may be more attractive employers for reasons unrelated to their use of digital technologies.

Result 5. (a) One of the main challenges for filling vacant positions is the lack of specific skills among applicants. It is named especially frequently by organizations with a high level of digitalization of business processes.

3.3 Benefits and Barriers of Digital HRM Tools

With our survey results we contribute to the call for more empirical evidence by Marler & Fisher (2013) and speak to the link between the adoption of digital HRM tools and their perceived benefits. Due to the need to preserve the anonymity of the respondents, we cannot obtain administrative data on organizational performance and can only analyze perceived benefits and barriers. Yet, we believe that they are important, as they shape companies' decisions to adopt technology and therefore deserve attention.

We summarize our results on benefits in Figure 1 and on barriers in Figure 2.

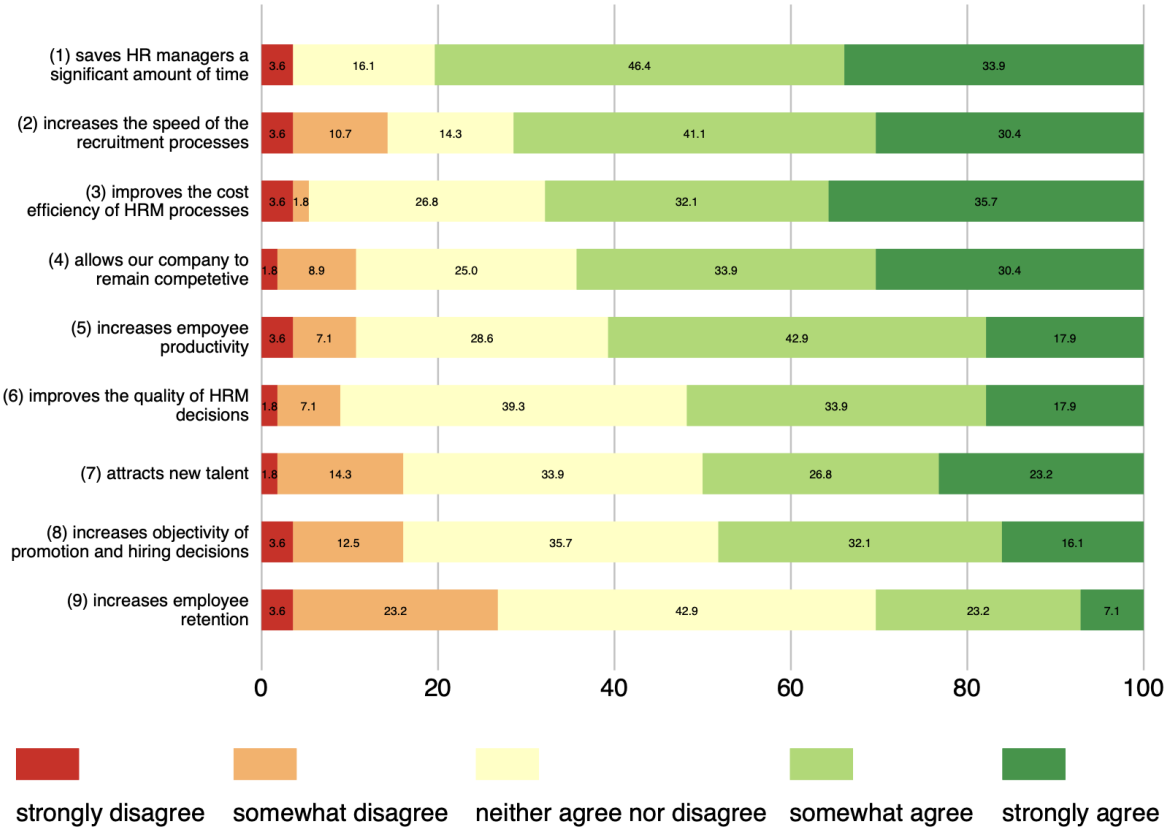
As three major benefits of introducing digital HRM tools the respondents see that these tools save HR managers' time, speed up the recruitment processes, and improve the cost efficiency of HRM (items 1, 2, and 3 in Figure 1).[10]

As can be inferred from Figure 2, respondents indicate that neither company management nor HR managers consider digital HRM tools useless (53% disagree with item 9 and 49% with item 6). It also appears that the market for digital solutions has tools that are suitable for most companies: only about 16% of respondents state that they cannot find appropriate digital tools (item 11). Difficulty of use and of integration in the existing organizational processes are of concern to less than 30% and 15% of respondents, respectively. However, we also note some significant barriers: around 50% of respondents report that their company faces difficulty finding HR professionals with the right IT skills, 55% report that meeting the budget constraints is difficult when purchasing digital HRM tools, and approximately 40% see regulatory and legal uncertainties as an important barrier. 56% of respondents indicate that one of the main reasons for not adopting digital HRM tools is concern that employees may feel monitored.

We find some systematic differences between the perceptions of benefits and barriers of digital HRM tools

[10] Some respondents did not answer all questions about the benefits and barriers of the digital tools: one response was missing in the benefits questions and three responses were missing regarding barriers.

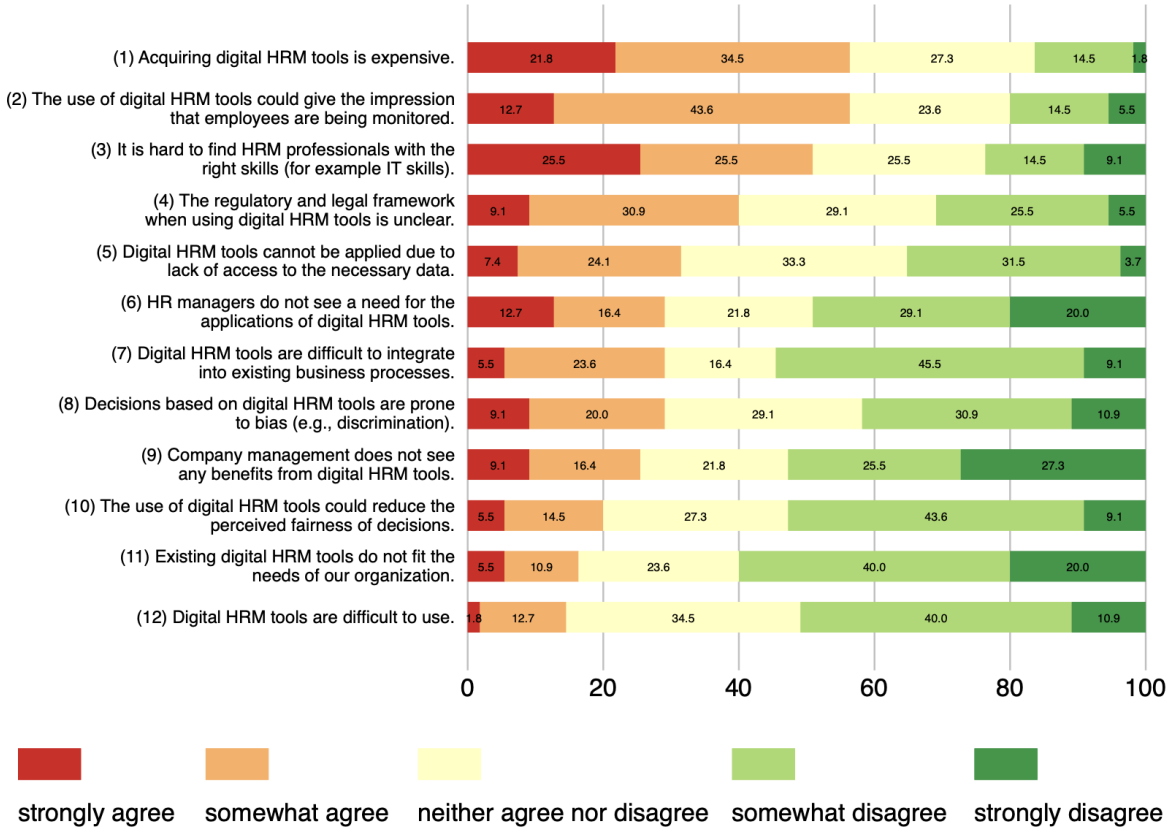
Figure 1: Benefits of digital HRM tools



Notes: This figure shows the distribution of answers (in %) to the following question: "Below are some statements that describe potential benefits of digital HRM tools. How much do these statements apply to your company? Please rate each statement on a scale from 1 "strongly disagree" to 5 "strongly agree". The use of digital HRM tools..."

by respondents from organizations that use advanced digital HRM tools (henceforth, AI adopters) and those that do not. Over all items, AI adopters rate the benefits and barriers of using of digital HRM tools more favorably by 0.34 points (on a 5-point Likert scale with 5 corresponding to the most favorable perception; see model (1) in Table A4). Importantly, the adoption of advanced HRM tools is an endogenous decision by the company that may depend on a variety of company and industry characteristics. Therefore, we control for industry, company ownership and size, and other characteristics in the regression analysis. Looking at the evaluation of the top three benefits and barriers items separately, we find suggestive evidence that AI adopters agree more with the survey's statements about benefits and less about barriers. However, the difference between AI adopters and non-adopters is only significant for items "Digital HRM tools increase objectivity of promotion and hiring decisions" ($p < 0.05$), "Acquiring digital HRM tools is expensive" ($p < 0.01$), and "Existing digital HRM tools do not fit the needs of our organization" ($p < 0.01$). Also, small and medium-sized companies agree with the importance of purchase costs to a larger extent than large companies ($p < 0.1$). It appears that those companies that do not use advanced digital HRM tools see fewer

Figure 2: Barriers to adoption of digital HRM tools



Notes: This figure shows the distribution of answers (in %) to the following question: "Below are some statements that describe potential barriers to the adoption of digital HRM tools. How much do these statements apply to your company? Please rate each statement on a scale from 1 "strongly disagree" to 5 "strongly agree"."

benefits and more barriers to adoption of digital HRM tools than do companies that already use these tools. From our data, it is not clear if the AI adopters overstate the benefits or non-adopters understate them. As the two groups of companies are likely to use different digital tools, with AI adopters being more likely to use more advanced technologies, this result may also reflect the fact that different tools may have different pros and cons.

While perceptions of benefits and barriers may contribute to the adoption decision, they are unlikely to be the only driver. Similarly, perceptions of barriers and benefits are likely to be shaped by company and industry characteristics.

Result 6. (a) Among the main benefits of using digital HRM tools are saving time for HR managers, speeding up recruitment, and improving the cost efficiency of HR processes. (b) Among the main barriers for adoption are: high costs, lack of HR professionals with IT skills and legal uncertainty. Additionally, the concern of how the use of digital HRM tools may be perceived by employees is likely to prevent their more

intense use. (c) Companies using advanced (AI-based) digital HRM tools are more optimistic about benefits that these tools might offer, and less concerned about the barriers.

3.4 Effect of Digital HRM Tools on Users

Apart from organizational benefits and barriers that drive or hinder the adoption of digital technologies, their use may affect individual users' responsibilities and work processes. The academic research on the impact of technology on work-related stress and job satisfaction documents the adverse effects of so-called technostress (Tarafdar et al. 2007).

Our empirical evidence does not point towards hidden costs of digital HRM tools: Respondents indicate that using digital HRM tools enables faster completion of tasks (75% agree or strongly agree; see Figure A1) and more effective communication (60%) and allows for more time for strategic tasks (54%). Only 15% somewhat agree that digital HRM tools increase their stress on the job. Additionally, we find rather limited evidence of a decrease in job satisfaction: 79% of respondents explicitly deny that the use of digital HRM tools decreases job satisfaction.

Table 4: OLS-regression analysis: Effect of advanced digital HRM tools on users

	(1)	(2)	(3)	(4)	(5)	(6)
	More work-related stress	Faster task completion	More time for strategic decisions	No decrease in job satisfaction	Better team spirit	More effective communication
AI adopters	0.971**	-0.198	-0.085	-0.386	-0.677	-0.768**
	(0.377)	(0.400)	(0.419)	(0.249)	(0.467)	(0.311)
SMEs	0.100	-0.391	-0.329	-0.759**	-0.093	-0.675*
	(0.427)	(0.530)	(0.414)	(0.353)	(0.381)	(0.350)
Observations	44	44	44	44	43	44
Adjusted R^2	0.034	-0.067	-0.018	0.122	-0.019	0.093

Notes: OLS regressions with robust standard errors reported in parentheses. In all models, the dependent variable is standardized and measured as the agreement with the respective positive or negative effect on a 5-point Likert scale with 1 corresponding to "strongly disagree" and 5 corresponding to "strongly agree". The main independent variable "AI adopters" in all models is equal to one if advanced digital HRM tools (such as AI, ML, NLP or algorithms) are adopted for at least one HR process, and zero otherwise. In all models, we control for company size, industry, ownership structure, revenues, and the average age of the workforce. The results remain unchanged when adding a control for HR responsibility.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Also, the effects of digital HRM tools on users differ between AI adopters and non-adopters (as defined above). When considering the results below, it must be noted that given the managerial role of our respondents, they might have contributed to the introduction of the advanced digital tools at their companies. Should this be the case, the positive effects might be overstated and negative understated. Respondents from AI adopter companies tend to agree that digital HRM tools increase work-related stress more often than those from non-adopter organizations (18% of adopters agree and 7% of non-adopters, $p = 0.008$, $\chi^2(3) = 11.91$). All other variables being equal, AI adopters agree by almost one standard deviation more strongly with the statement that digital HRM tools increase work-related stress (model (1) in Table 4: $\beta = 0.97$, $p = 0.015$).

AI adopters (and similarly SMEs) also agree less often that digital HRM tools improve the effectiveness of communication as compared to non-adopters (or non-SMEs): 73% of non-adopters agree or fully agree with a positive effect of digital HRM tools on communication effectiveness, as compared to 55% of adopters. Indeed, AI adopters report 0.77 standard deviations lower agreement with the statement that digital HRM tools lead to more effective communication, ceteris paribus ($p = 0.019$, in model (6)). The perception that using digital tools contributes to having more time for strategic tasks is stronger among adopters (66% agree or strongly agree) than among non-adopters (40% agree or strongly agree). However, this difference is not statistically significant and disappears when we control for company characteristics in a regression analysis (see model (3) in Table 4). Looking at the magnitude of the coefficients, it appears that SMEs might in general be more skeptical towards digital HRM tools than their larger counterparts. They disagree significantly more strongly with the statements that HRM tools do not decrease job satisfaction ($\beta = -0.76$, $p = 0.039$) and do lead to effective communication ($\beta = -0.68$, $p = 0.062$). We do not document systematic differences if we additionally consider the effects of digital HRM tools among AI adopting SMEs versus non-adopting SMEs (Table A6). A notable exception is faster task completion (model 2): AI adopting SMEs report stronger agreement with the statement that digital HRM contribute to faster task completion ($\beta = 1.86$, $p = 0.018$).

Result 7. (a) Overall, the negative impact of digital HRM tools on the workload and workflow of HR professionals and managers is very limited. A significant share of respondents indicate that digital HRM tools enable them to complete tasks faster, communicate more effectively, and find more time for strategic tasks. (b) Yet, the adoption of *advanced digital HRM tools* is associated with higher work-related stress and less effective communication among colleagues.

3.5 Future Strategies of the Companies

Our survey included questions on future plans on digitalization of HR processes. Specifically, we asked "For which HR processes will the level of digitalization in your company most likely increase in the next six months?" 73% of respondents expect the use of digital technologies to grow for at least one HR process in the next six months (with 3.7 processes on average). The effect of the ongoing global pandemic that began in 2020 is clearly reflected in these expectations: The strongest increase in the use of digital technologies is expected in the area of conducting interviews (40% of respondents), on-boarding (33% of respondents), and administrative tasks (30%). Only 16% of respondents expect more digitalization in functions such as HR-controlling and People Analytics. We observe a certain path dependency: companies that already use some advanced digital HRM tools expect a higher increase in the use of digital technologies in HR processes in the next six months (see model (1) in Table A7, $\beta = 1.87$, $p = 0.007$, controlling for company characteristics). In the same regression model, the coefficient for SMEs is also positive and significant, meaning that SMEs expect to digitalize more processes than non-SMEs in the upcoming six months.

Result 8. (a) The use of advanced digital HRM tools is positively correlated with expectations about future digitalization of HR processes. (b) A higher number of HR processes is expected to be digitalized in the near future in small and medium-sized enterprises.

Respondents were also asked which of their daily HR-related tasks they would like to receive more *automated decision support* for. The most commonly mentioned tasks for which digital decision support would be appreciated were dealing with administrative tasks (45%), office organization (37%), and workforce planning (33%). This might be an indication that respondents would like to outsource most mundane and routine tasks. It may reflect the demand and potential for a fruitful application of AI and other digital tools, as these are exactly the kinds of tasks that can already be successfully automated. This finding seems to hold for both larger and smaller firms.

Respondents from AI adopting organizations indicate a significantly higher number of HR processes for which they would like to receive more support than do other respondents (see model (2) in Table A7, $\beta = 1.65$, $p = 0.001$, controlling for company characteristics).

Result 9. (a) Automated decision support for administrative tasks, office organization, and workforce planning are among the most frequently cited HR processes where respondents call for more digitalization. (b) Respondents from the companies that already use advanced digital HRM tools expressed more desire for automatic decision support than those that do not. There is no significant difference between SMEs and large enterprises.

4 Outlook and Discussion

This empirical study documents the level of digitalization and the use of AI-based tools in HR management in 57 German enterprises. It also sheds light on benefits of and barriers to the adoption of digital tools, with a particular focus on HR management. Most of the respondents report that the core business processes are already digitized and a great deal of data is already stored digitally, which is the first and necessary step for the use of more advanced (i.e., AI-based) technologies. Our survey was conducted in the midst of the COVID measures in Germany (February 2021), and a large majority of respondents (81%) agree that the degree of digitalization increased during the pandemic. Importantly, they do not anticipate a return to pre-pandemic processes: 91% agree that the companies will keep digital processes that were introduced in 2020.

In general, we observe rather optimistic attitudes towards digital HRM tools. The respondents believe that the use of advanced digital HRM tools offers many benefits and expect (and wish) to expand their use of these tools in the near future. The use of digital HRM tools is perceived as a facilitator of speed and efficiency

in companies' processes. The use of digital tools also positively correlates with ease of talent acquisition.

Among major barriers to adoption are a shortage of HR professionals with IT skills, high costs of digital tools and legal uncertainty. Apart from these external barriers, the concern that the use of digital HRM tools may trigger the perception among employees of constant surveillance hinders further adoption of digital HRM tools. These concerns seem to be justified, as employees largely disapprove of digital monitoring.[11] The benefits and barriers are largely similar for SMEs and large companies. To overcome the shortage of HR professionals with IT skills, many companies invest in developing the qualifications of their own employees and offer IT training to their HR specialists (54%). A large majority of companies (71%) have an HR-IT specialist.

The respondents agree that advanced digital HRM tools need to be audited with respect to their effectiveness, including data protection, potential discrimination, and overall quality of produced decisions (91%). According to 65% of respondents, such control should not be the responsibility of one actor only. Most of the respondents (70%) believe that the company that uses the tool should evaluate it. The second most frequent answer is that the provider of the tool should be the one to evaluate it (45%). The option of delegating it to a dedicated external certification company or to a governmental body appears to be less popular (9% and 21%, respectively). Interestingly, 79% of respondents who have HR responsibilities agree that the evaluation should be done by the company itself, in contrast to only 53% of respondents with no HR responsibilities ($p = 0.04$, $\chi^2(1) = 4.19$).

The companies that have already adopted some advanced digital HRM tools are more optimistic about the benefits and less bothered by the barriers. Users, speaking about their personal experiences, are also more positive about the use of digital tools due to an increase in productivity and time available for strategic tasks. Respondents would welcome more digital support for administrative and organizational tasks.

Attitudes towards digital HRM might be context-dependent (Theres 2021). However, the presented results offer reason for optimism, since our sample includes companies with varied characteristics. For example, we do not observe systematic differences based on company size. Taken together with the generally positive attitudes and expectations that exist with regard to adoption of the technology and the promotion of the topic by policy makers, if the barriers to adoption are addressed appropriately, one may expect a quality shift in how digital tools are used in HR in the near future. Our respondents volunteered to take part in this survey about the use of technology in HRM, so it is possible that they stem from more technologically advanced and aware companies. Additionally, HR in general appears to be one of the most digitized and digitalized business functions (Zolas et al. 2021), and we caution against extrapolating the results onto other domains.

[11] See "Welcome to the Era of the Hyper-Surveilled Office," The Economist (The Economist Newspaper, May 14, 2022), https://www.economist.com/business/welcome-to-the-era-of-the-hyper-surveilled-office/21809219.

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A Appendix: Tables and Figures

Table A1: Average degree of digitalization of HR processes

HR Process		Total (N=57)		Large enterprises (N=38)			SMEs (N=16)	
		Mean	Std. Dev.	Mean	Std. Dev.	Diff.	Mean	Std. Dev.
(1)	Job advertisement	4.38***	0.76	4.29***	0.78	<	4.60***	0.63
(2)	Internal communication	3.89***	1.05	3.97***	0.91	>	3.86**	1.29
(3)	HR-controlling	3.71***	1.17	3.86***	1.13	>	3.36	1.36
(4)	Compliance systems	3.69***	1.14	4.00***	0.85	>**	3.12	1.46
(5)	People Analytics	3.64***	1.22	3.68**	1.21	>	3.50	1.35
(6)	Compensation & benefits	3.62***	1.31	3.94***	1.18	>**	3.07	1.33
(7)	Administrative tasks	3.56***	0.82	3.68***	0.83	>	3.47**	0.74
(8)	Applications screening	3.45***	1.14	3.43**	1.14	<	3.67**	1.05
(9)	Workforce forecasting & planning	3.44**	1.18	3.72***	1.00	>*	3.00	1.30
(10)	On-boarding	3.42**	1.18	3.58***	1.09	>	3.27	1.28
(11)	Talent development	3.31	1.35	3.40	1.30	>	3.23	1.42
(12)	Ability & personality tests	3.26	1.42	3.29	1.41	<	3.31	1.44
(13)	Retention management	3.05	1.21	3.15	1.12	>	3.00	1.36
(14)	Recruitment interviews	3.00	1.27	3.00	1.20	<	3.13	1.41

Notes: The table provides information on the digitalization of the various HR processes. Means and standard deviations were calculated based on the non-missing responses, which vary between 36 and 48 for different functions. Three respondents did not reveal their company's revenues, so these observations are included in the "total" statistics but not in the statistics by company size. The share of fully or predominantly digital companies is calculated based on the total sample size of N=57. Thus, depending on the actual number of responses, the numbers might be higher. Statistically significant differences between large and small and medium-sized enterprises are indicated by * for $p < 0.10$, and ** for $p < 0.05$ (2-sided t-test).

Table A2: Ordered probit regressions: Digitalization and difficulties in acquiring talent

Model	Independent variable	Coef.	Robust SE	N	Pseudo R^2
(1)	Digitalization of business processes	-0.425***	0.163	51	0.172
(2)	Use of data-driven approaches in HR	-0.352**	0.143	50	0.196
(3)	Use of advanced digital HRM tools	-0.302**	0.135	51	0.172
(4)	Digitalization of job advertisement	-0.589***	0.218	44	0.151
(5)	Digitalization of workforce planning	-0.550***	0.182	41	0.208

Notes: This table is a robustness check for the OLS regressions reported in Table 3. It reports coefficients and robust standard errors of the ordered probit regressions with the dependent variable *Difficulty in acquiring talent*, measured as agreement with the statement "It is challenging for our company to fill vacancies" on a 5-point Likert scale where 1 corresponds to "strongly disagree" and 5 to "strongly agree". The main independent variables vary across models and are named in the second column. In model (1), it is the degree of digitalization of (all) business processes. It is measured on a 5-point Likert scale with 5 indicating highest degree of the digitalization. In model (2) the independent variable is the use of data-driven approaches in HR management. Model (3) controls for the use of advanced digital HRM tools. These variables are elicited on a 5-point Likert scale with 5 corresponding to the "very widespread use" and 1 to "no use". In models (4) to (5), the main independent variables capture the degree of digitalization of HR processes such as job announcements and workforce planning and forecasting. These two variables are asked on a 5-point Likert scale with 5 corresponding to "fully digital" and 1 to "not digital at all". In all models, we control for company size, industry, ownership structure, revenues, and the average age of the workforce. Adding controls for increasing and decreasing employee headcounts from 2018 to 2019 does not change results. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: Marginal effects (probit) of digitalization on type of difficulties in talent acquisition

	Degree of digitalization (Use of advanced digital HRM tools)	(1) Too few applications	(2) Lack of general skills	(3) Lack of specific skills	(4) Applicants reject offers
(1)	Digitalization: Business processes	-0.031	0.006	0.135**	-0.037
		(0.094)	(0.099)	(0.064)	(0.060)
(2)	Use of data-driven approach in HR	-0.008	-0.064	0.063	-0.094
		(0.104)	(0.105)	(0.077)	(0.071)
(3)	Use of advanced digital tools in HR	-0.106	-0.012	-0.057	-0.007
		(0.074)	(0.081)	(0.055)	(0.047)
(4)	Digitalization: Job advertisement	0.258**	-0.001	0.140	-0.067
		(0.124)	(0.139)	(0.096)	(0.074)
(5)	Advanced digital HRM tools: Job advertisement	-0.168	0.223	-0.690***	0.445
		(0.235)	(0.281)	(0.237)	(0.286)
(6)	Digitalization: Application screening	0.098	0.046	0.077	0.006
		(0.104)	(0.098)	(0.072)	(0.057)
(7)	Advanced digital HRM tools: Application screening	-0.064	0	-0.119	-
		(0.291)	(0.327)	(0.277)	
(8)	Digitalization: Recruitment interviews	0.102	-0.028	0.048	0.022
		(0.089)	(0.091)	(0.066)	(0.053)
(9)	Advanced digital HRM tools: Recruitment interviews	0.051	-0.328	-	-
		(0.353)	(0.228)		
(10)	Digitalization: Ability and personality tests	-0.007	0.014	0.056	-0.055
		(0.081)	(0.083)	(0.059)	(0.060)
(11)	Advanced digital HRM tools: Ability and personality tests	-0.081	0.126	-0.468**	0.215
		(0.216)	(0.239)	(0.231)	(0.203)
(12)	Digitalization: Workforce planning and forecasting	0.016	-0.166*	0.047	-0.047
		(0.088)	(0.096)	(0.068)	(0.057)
(13)	Advanced digital HRM tools: Workforce planning and forecasting	-	0.295	-0.164	-
			(0.279)	(0.272)	

Notes: This table reports marginal effects of the probit estimation with the dependent variables equal to one if particular reason for difficult talent acquisition was named and zero otherwise. We control for the company size. The sample includes companies that indicated having difficulties in talent acquisition. The number of observations varies between 23 and 28. "-" indicates that the independent variable had no variation in the subsample. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A4: Regression analysis: Benefits and barriers by adoption of advanced digital HRM tools

	Pooled	Benefits				Barriers			
	General optimism (over all benefits and barriers)	(1) Time saving	(2) Cost efficiency	(3) Speed of recruitment	(4) Decision objectivity	(1) Costs of initial purchase	(2) Monitoring	(3) HR-IT skills	(4) Fit to organization
AI adopters	0.337*	0.467	0.304	0.341	0.583**	-0.891***	-0.151	-0.674	-0.950***
	(0.181)	(0.338)	(0.404)	(0.385)	(0.277)	(0.258)	(0.314)	(0.404)	(0.312)
SME	0.086	-0.144	-0.306	-0.096	0.581	-0.838*	-0.411	-0.278	0.110
	(0.208)	(0.296)	(0.390)	(0.502)	(0.386)	(0.445)	(0.459)	(0.549)	(0.341)
Observations	1,058	51	51	51	51	50	50	50	50
Adjusted R2	0.232	0.072	-0.123	-0.152	0.068	0.197	-0.131	-0.055	0.179

Notes: The first model is a random effects panel regression with the dependent variable *optimistic view towards a benefit or barrier*. It is estimated from data on all benefits and barriers, and includes 21 data points per respondent clustered on the individual level. All other models are OLS regressions with one data point per respondent. Robust standard errors are reported in parentheses. The dependent variable is measured as the agreement with the benefit or barrier on a 5-point Likert scale with 1 corresponding to "strongly disagree" and 5 corresponding to "strongly agree". The main independent variable "AI adopters" in all models is equal to one if *advanced digital HRM tools* are adopted for at least one HR process, and zero otherwise. In all models, we control for company size, industry, ownership structure, revenues, and average age of the workforce. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: Ordered probit regressions: Effect of advanced digital HRM tools on users

	(1) More work-related stress	(2) Faster task completion	(3) More time for strategic decisions	(4) No decrease in job satisfaction	(5) Better team spirit	(6) More effective communication
AI adopters	1.279***	-0.291	-0.168	-0.561	-1.017**	-0.948**
	(0.494)	(0.458)	(0.475)	(0.411)	(0.542)	(0.384)
SME	0.101	-0.557	-0.397	-1.189**	-0.034	-1.005**
	(0.498)	(0.625)	(0.540)	(0.509)	(0.443)	(0.459)
Observations	44	44	44	44	43	44
Pseudo R^2	0.127	0.102	0.101	0.230	0.150	0.159

Notes: This table is a robustness checks for the OLS-regressions reported in Table 4. It reports coefficients and robust standard errors of the ordered probit regressions. In all models, the dependent variable is measured as agreement with the respective positive or negative effect on a 5-point Likert scale with 1 corresponding to "strongly disagree" and 5 corresponding to "strongly agree". The main independent variable "AI adopters" in all models is equal to one if advanced digital HRM tools (such as AI, ML, NLP, or algorithms) are adopted for at least one HR process, and zero otherwise. In all models, we control for company size, industry, ownership structure, revenues, and average age of the workforce. The results remain unchanged when adding a control for HR responsibility. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A6: OLS-regression analysis: Effect of advanced digital HRM tools on users

	(1) More work-related stress	(2) Faster task completion	(3) More time for strategic decisions	(4) No decrease in job satisfaction	(5) Better team spirit	(6) More effective communication
AI adopters	0.951*	-0.941**	-0.111	-0.359	-0.512	-0.724
	(0.521)	(0.351)	(0.591)	(0.309)	(0.676)	(0.473)
SME	0.132	-1.644***	-0.373	-0.714**	0.182	-0.601
	(0.599)	(0.584)	(0.636)	(0.342)	(0.625)	(0.611)
AI adopters x SME	-0.0478	1.860**	0.0649	-0.0679	-0.411	-0.110
	(0.680)	(0.744)	(0.771)	(0.501)	(0.749)	(0.545)
Observations	44	44	44	44	43	44
Adjusted R^2	0.003	0.082	-0.050	0.094	-0.044	0.065

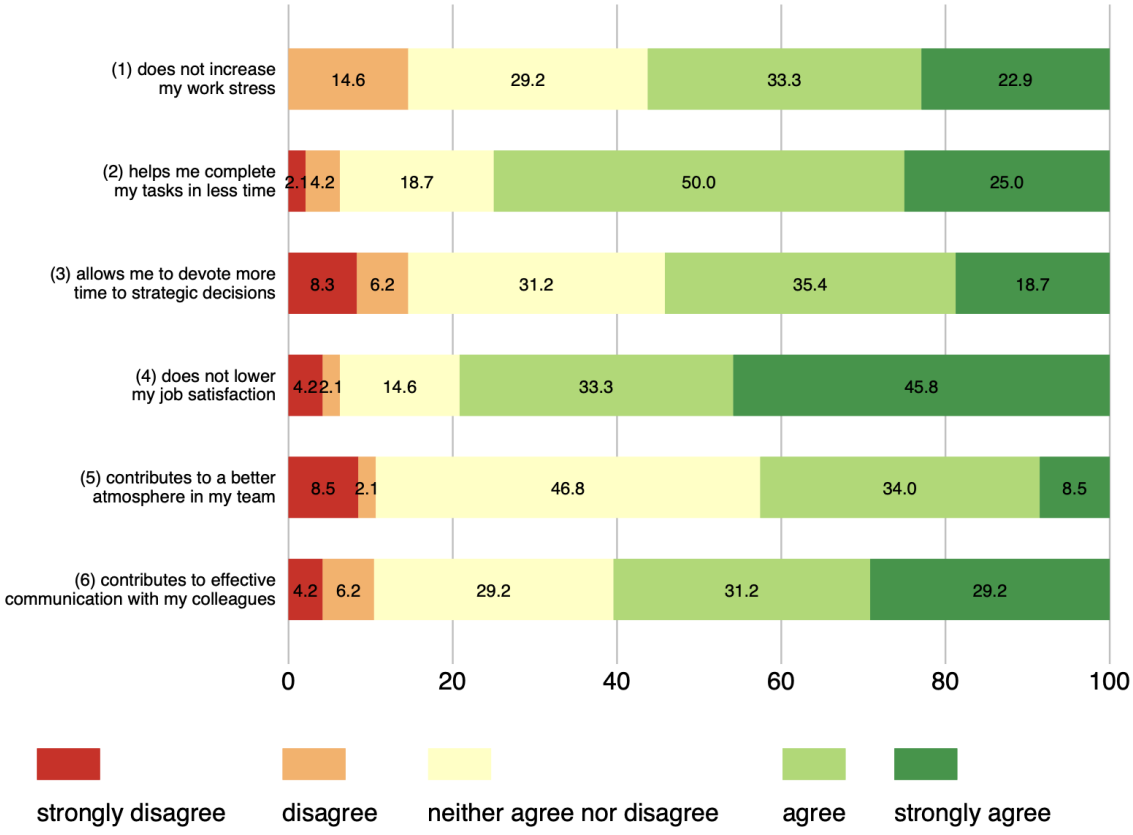
Notes: OLS regressions with robust standard errors reported in parentheses. In all models, the dependent variable is standardized and measured as agreement with the respective positive or negative effect on a 5-point Likert scale with 1 corresponding to "strongly disagree" and 5 corresponding to "strongly agree". The main independent variable "AI adopters" in all models is equal to one if advanced digital HRM tools (such as AI, ML, NLP or algorithms) are adopted for at least one HR process, and zero otherwise. In all models, we control for company size, industry, ownership structure, revenues, and average age of the workforce. The results remain unchanged when adding a control for HR responsibility. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A7: OLS-regression analysis: Expectations and demand

	(1)	(2)	(3)
	Expected digitalization (N of HR processes)	Desire for more automated decision support (N of HR processes)	
AI adopters	1.865***	1.649***	1.333***
	(0.659)	(0.448)	(0.377)
SME	1.876**	-0.281	-0.378
	(0.724)	(0.588)	(0.536)
HR responsibility			1.200**
			(0.473)
Observations	52	52	52
Adjusted R^2	0.086	0.238	0.348

Notes: OLS regressions with robust standard errors reported in parentheses. In model (1), the dependent variable is measured as the number of processes that are likely to become more digital within the next six months (from zero to 13). In models (2) and (3) the dependent variable captures the number of HR tasks where more automatic decision support is desired (from zero to ten). The main independent variables are: "HR responsibility", which equals one for respondents who stated they have HR responsibility, and zero otherwise; and "AI adopters", which is equal to one if advanced digital technologies (such as AI, ML, NLP, or algorithms) are adopted for at least one HR process, and zero otherwise. SME is a dummy variable that is equal to one for SMEs and zero otherwise. In all models, we control for company size, industry, ownership structure, revenues, and average age of the workforce. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure A1: The impact of digital HRM tools on users



Notes: This figure shows the distribution of answers to the following question: "How do the digital HRM tools used in your company impact your job? Please rate each statement on the scale from 1 "strongly disagree" to 5 "strongly agree". The use of digital tools ..."