

2

Workplace innovation at the digital frontier

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Introduction¹

The European Company Survey 2019 (ECS) found that establishments that highly involved their personnel in decisions on organisational change and innovation and at the same time were prepared to invest strongly in their personnel were 'highly digitalised'. Establishments that did neither (the 'low investment, low involvement' group) showed 'limited digitalisation' (Eurofound & Cedefop, 2020). The 'high involvement, high investment' type of company practices may be differentiated from other company practices mainly by more possibilities for employees to voice their concerns, more comprehensive training, more open-ended contracts and more collaborative supplier relationships. In the previous ECS (conducted in 2013), Eurofound aligned the high involvement, high investment practices, with workplace innovation (Eurofound, 2015). High involvement, high investment practices can be aligned with 'high road' strategies; low investment, low involvement with 'low road' strategies (Osterman, 2018). The central question in this chapter concerns what kind of organisational practices digital leaders in Europe have and how these organisational practices are supportive of digitalisation.

The digital transformation in Europe is in a new phase in regard to the automation efforts of companies. The application of digital technologies is used to enhance the network relationships between technologies (cyber-physical systems; the Internet of Things (IoT)); between technologies and company strategies (data-enabled production); and between the company and its envi-

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ronment (suppliers, customers, others). This changeover is sometimes called Industrie [or Industry] 4.0 (Warhurst et al., 2020). Digital technologies such as (collaborative) robots, machine learning, artificial intelligence (AI) and connected technologies change the way companies shape tasks and jobs (Frey & Osborne, 2017).

Background

Given that there are strong predictions about the impact of technological change, the question is, what can we see in companies on the digital frontier? Can we relate what happens on the shopfloor of these companies to the organisational practices of these companies? The ECS 2019 is cross-sectional and cannot determine the direction of the association, but it seems that organisations that invest heavily in learning environments and HR practices see more implementation of digital technologies. The influence of organisational practices and technology on skills was investigated in a recent panel study by Dhondt et al. (2021). Technology does not itself impact skills development, but the organisational model does show strong impacts on skill use. Workers shifting from a workplace innovation type of model (see Oeij & Dhondt, 2017, p. 66 for a definition of workplace innovation) to a more ‘Tayloristic’ organisational model become more restricted in skills use, and vice versa.

Research on digital transformation tends to see organisational practices as disparate human resources (HR) measures. A recent European Commission (2021) study among European small and medium-sized enterprises (SMEs) identified which internal and external factors act as key determinants of digital transformation. Listed as internal factors are: managerial ability; access to talent and digital skills deficits; ability to connect a digital strategy with a concrete business model; and behavioural characteristics at the individual level. Brynjolfsson and Milgrom (2013) indicate that organisational and HR measures tend to be complementary. An organisation with a specific set of practices will tend to have complementary measures (Brynjolfsson & Milgrom, 2013, p. 11). Companies need to create environments that help job occupants shape their jobs, and to have jobs that improve their skill sets. Team environments are needed that integrate individuals with overlapping high-tech skill profiles (Dhondt & Van Hootegeem, 2015).

The mediating impact of the organisational practices may explain why other changes to occupations occur than those predicted by more technology-determinist thinkers (Frey & Osborne, 2017). It could be that, rather than job losses or job gains, the current technological transformations

might result in jobs being reconfigured (Handel, 2022). This redefinition points to the fact that we may need to check which skills are required from workers. The call for higher-level skills (i.e. ‘21st century skills’; Van Laar et al., 2017) to overcome future employment disruption connects to renewed discussion about the role of lifelong learning to help foster workers’ adaptability to changing labour markets over their working life (Barnes et al., 2016). There are serious digital skill deficits amongst some workers. However, there are other skills needed too. The different tasks identified by Fernández-Macías et al. (2016)² map onto various skill sets, for example, technical, analytical, behavioural, transversal, leadership and T-shaped skills.

For this study, to understand the association between organisational policies and digital technologies we need to develop an understanding of the technologies implemented and how organisational policies help shape the choices. For example, do digitally transformed companies with highly automated production systems invest in high-road company policies (‘high involvement, high investment’)? Or do such companies opt for low-road strategies and models for producing cost-driven services (‘low investment, low involvement’)? Do we see the different impacts of digital technologies?

Methodology

Case study approach

This qualitative study uses a case study approach to understand the technological and organisational state in 30 company cases at the digital frontier. The focus is to disentangle the logic the case companies follow to adopt and implement digital technologies, and which organisational practices they follow. How do they deal with the knowledge requirements that the digital technologies bring along? The qualitative approach is exemplified by trying to reduce the different situations in the 30 companies to a limited set of types of technological and organisational practices. For the methods, we refer to Oeij et al. (2022). The following typologies are used.

² In their taxonomy, they identify tasks in terms of content (physical tasks, intellectual tasks, social tasks) and in terms of methods and tools of work (methods: autonomy, teamwork, routine; tools: digital, non-digital).

Workplace innovation practices

The ECS 2019 (Eurofound & Cedefop, 2020) provides a useful typology of organisational practices. We reproduce part of the typology of the ECS 2019. The ECS typology identifies four main company practices. The first type is the ‘high involvement, high investment’ type of company practices, which can be differentiated from the other types mainly because it offers more possibilities for employees to voice their concerns, more comprehensive training, more open-ended contracts, and more collaborative supplier relationships. This type is most comparable to what we have defined as workplace innovation company practices, because it emphasises employee involvement, which is the core of workplace innovation (see Oeij & Dhondt, 2017). The ‘selective investment and moderate involvement’ type may be identified as using more selective training opportunities and more part-time working arrangements. This type of arrangement is more gender-focused and can be qualified as a gender-sensitive arrangement. The ‘moderate investment and irregular involvement’ type has one distinguishing characteristic, namely the use of open-ended contracts. The ‘low investment and low involvement’ type uses open-ended contracts and is less focused on external collaboration.

Digital transformation

Digital transformation is discussed quite extensively (Hermann et al., 2016). However, as Genz (2022, p. 1) indicates, there is a ‘scarcity of datasets that provide measures of the usage of advanced technologies at the firm level and accompanying workers’ outcomes’. For the case survey, we use the typology of technologies used by the European Commission (2021) in their SME-study mapping technology adoption and organisational practices. Their definition of digital transformation is broader than just a set of technologies (European Commission, 2021, p. 2) and sees digital transformation (DX) as the next step after the digitalisation of products and production processes. The focus is on changes in the company’s business model, products, processes and organisational structure. The company perspective is helpful for this study.

The main ingredients for these typologies are comparative tables for the 30 companies. These basic tables were further reduced by inductive coding to the core content (core variables), for which we compared the cases (Miles et al., 2013). For each typology, several cases provide information. To enhance the reliability of these typologies, we used several researchers to make the qualifications. The researchers discussed the different eventual classifications of cases and tried to obtain a consensus.

Table 2.1 Descriptives for the 30 cases

		Number of cases
Country	Bulgaria	5
	Finland	5
	Germany	5
	The Netherlands	5
	Spain	5
	United Kingdom	5
Size	Large (>250–15 000 employees)	14
	SME (>30–250 employees)	8
	Start-up, small (<30 employees)	6
	Missing	2
Date of establishment	<1899	2
	1900–99	14
	2000–09	8
	2010+	6
Main sector	Advanced manufacturing	12
	Software, digital health	15
	Logistics and maintenance	3

Cases

The cases were selected from our study into entrepreneurial ecosystems in Europe (Dhondt et al., 2022). In discussion with the stakeholders in each of the ecosystems, example companies were identified and selected. Stakeholders looked for core companies, suppliers and customer companies that represented the leading technological and organisational practices in the ecosystems. Many of the company cases are leaders in their sector in the use of digital technologies. Other companies in the selection are at best users of digital technology. Table 2.1 shows the main descriptives for these 30 companies, namely, country, size, date of establishment and main sector.

Half of the cases (18) correspond to major corporations with multiple locations around the world. We limited the investigation to one geographical location of such major corporations. Interviews and surveys were conducted in

each of these cases. Managers and employees needed to describe the situation for this particular location. Half of the cases (16) were established before 2000, the rest after this date. This distribution indicates that start-ups and mature companies with long tradition are compared. The start-ups that have been selected are in the first phase of their development. They may ultimately still fail to scale up. The sectors show that the cases reflect the situation in Industrie 4.0-type of companies (advanced manufacturing), and digitalisation from the perspective of software producers and users. However, the database remains quite heterogeneous and selective.

Analytical approach

The cases present a first understanding of what companies do when confronted with digital transformation. To understand the relationship between digitalisation and organisational practices, we focus on three analyses: (1) the prevalence of organisational practices and digitalisation; (2) the motives to invest in digital technologies and the barriers the cases encounter in these investments (these motives and barriers can give insight into why companies select specific organisational practices); and (3) differences in organisational practices between digital leaders and followers, and the reasons for these differences. Managers and employees have reflected on the motives to implement digital technologies and barriers to the implementation. Because the core companies have been selected as advanced in the six countries, the answers are biased towards digital ‘survivors’ and ‘winners’.

To understand how the cases perform, we use the FLASH-Eurobarometer (European Commission, 2021) and the European Company Survey (Eurofound & Cedefop, 2020) as a comparison base. These comparisons assist in understanding the external validity of the results. To illustrate our results, we describe the examples of the actual organisational practices of the cases.

Workplace innovation practices among the cases

Using the Eurofound/Cedefop classification, we identified the degree to which the organisational practices are characteristic of workplace innovation. Table 2.2 compares the cases to the Eurofound/Cedefop distribution. For three UK cases, the information collected during the interview was insufficient to classify the cases.

Table 2.2 Organisational practices among the case studies (n=27; 3 missing)

Organisational type	Cases	Eurofound/ Cedefop 2020
1. Low investment, low involvement	22%	21%
2. Moderate investment, irregular involvement	15%	27%
3. Selective investment, moderate involvement	15%	32%
4. High investment, high involvement ('workplace innovation')	48%	20%

Table 2.2 shows that half of the cases (13) are in the high investment, high involvement group. This is more than double the percentage in the Eurofound/Cedefop study. The overrepresentation of this type is expected with major companies that already outperform their competition. Still, six cases – and a similar percentage to Eurofound/Cedefop – are categorised as low investment, low involvement. Five of these companies are small companies, start-ups with no focus on managing human resources. These companies are strongly focused on gaining entrance into their market. The companies in the different organisation types show differences in practices in employee involvement, the hallmark of workplace innovation. Table 2.3 provides two examples per type.

Qualifying the digital transformation among the cases

Table 2.4 assesses how the cases see themselves in their technology development and compares the results with the FLASH-study.

Table 2.5 provides the specific technologies used.

All the cases have commenced adopting advanced digital technologies, compared to 67 per cent of the SMEs in the FLASH-study, meaning that the cases are technically more advanced than the SMEs in the FLASH-study. About half of the cases (see Table 2.5) have introduced AI/ML or robotics, compared to only eight per cent of the SMEs. Cloud computing, smart devices, big data analytics and high-speed infrastructure are quite common technologies in the cases. Blockchain applications are seen in a few cases, but still more often than in the FLASH-study. In one case, blockchain is used to map parts that are

delivered to customers. The technology is used to maintain a stable database of these parts. The main conclusion that can be drawn from the comparison between the cases and the FLASH-SMEs is that the cases represent far more digital technological situations.

Table 2.3 Comparison of organisational practices among two cases per organisational type

Organisational type	Cases
1. Low investment, low involvement	ES1 is a very small start-up with engineers trying to launch a new technological product. The company relies on referrals by colleagues or externals and has no capacity to start training employees for new tasks. It works with funding from one venture capital company and needs to show their success in the short term. There is no attention to the internal organisation. GE5 delivers last-mile logistics for its customers. The company survives by using low-skilled, low-paid personnel. It is organised for 'personnel attrition': high personnel turnover and no long-term employment. It uses digital planning software to reduce the learning times and eliminate any workforce dependency.
2. Moderate investment, irregular involvement	ES2 recruits students from Vocational Education and Training (VET) schools and then trains them for positions in manufacturing. The company applies teamwork in a project-driven environment. The company does have a works council. Training is limited. BG1 works with a flat structure and has 'open-minded' hiring practices and activities focused on team building. It lacks employee voice, and does not have a trade union present.
3. Selective investment, moderate involvement	F13 has been growing quite steadily, with the support of private equity funding. The company is selling very specific technology-based products and needs rapid development. It does invest in on- and off-the-job training, an open culture, and personal development. However, the possibilities for employees to express their voice seem limited. BG2 is part of a global company. The office has grown into a major player in the Bulgarian context. It is organised for 'attrition' in this sense that personnel turnover is 16% to 20% on a yearly base. Employee voice is not channelled in the organisation: it depends on the 'courage' of the employee to act. BG2 explains that it has developed an internal academy to upscale talent, and it engages external consultants to come in and train the new colleagues.
4. High investment, high involvement ('workplace innovation')	ES5 is a company owned by its personnel. It is a small company and manufactures and markets its own products. Workers are very involved in all domains of company policy. NL3 is a producer that has shown significant growth in personnel over the past decades. Knowledge management is a core element of its strategy, focusing on mastering all knowledge and skills needed for its production. Workers have a voice via the workers council and employee ownership.

Table 2.4 Comparison of cases with the FLASH-Eurobarometer (European Commission, 2021): type of technology situation

Answer	Number of cases	Total %	FLASH (all)
A 'Your enterprise has adopted or is planning to adopt basic digital technologies such as email or a website but not advanced digital technologies.'	1	3%	33%
B 'There is a need to introduce advanced digital technologies but your enterprise does not have the knowledge or skills or financing to adopt them.'	1	3%	7%
C 'There is a need to introduce advanced digital technologies and your enterprise is currently considering which of them to adopt.'	4	13%	10%
D 'There is a need to introduce advanced digital technologies and your enterprise has already started to adopt them.'	23	78%	25%
E 'Your enterprise does not need to adopt any digital technologies.'	1	3%	1%

Table 2.5 Comparison of presence of digital technologies in cases and FLASH-study

	Number of cases reporting use	Total %	FLASH (all)
Artificial intelligence / machine learning (AI/ ML)	14	46%	6%
Cloud computing	27	90%	45%
Robotics	14	46%	7%
Smart devices	20	66%	25%
Big data analytics	22	73%	12%
High-speed infrastructure	20	66%	31%
Blockchain	4	13%	2%
None; don't know	0	0%	33%; 1%

To gain further understanding of the technological paths among the cases, two steps were taken to identify specific technological strategies for the cases. A first refinement is to understand if the cases are digital transformers, that is, where digital technology is used to transform business models. SMEs that use digital technology only as a tool are called digital users. Our analysis identified whether companies develop servitisation strategies and direct or support their operations towards customers in a digital fashion.

Table 2.6 Four types of digital transformation among the cases (n=30)

	Digital transformers	Digital users
Total	4 (13%)	(0%)
AI/ML	7 (23%)	(0%)
Robotic	5 (17%)	(0%)
Low-user	3 (10%)	11 (37%)

Table 2.6 shows that one-third of the cases in our study can be classified as users and two-thirds as digital transformers. A second refinement is to understand if different digital paths are deployed. With the AI/ML and robotics criteria, we distinguish four types of digital transformation: companies that have invested in nearly all technologies: the ‘Total (digital) category’; companies that have invested in AI/ML as the main distinguishing trait; companies that have invested in robotics, next to other technologies (Robotic type); and companies that have some digital technologies but have no AI/ML or robotics (Low-user type). The following table compares the presence of digital technologies among digital transformers (DX) and digital users.

Eleven of the Low-user group are ‘users of digital technology’. The other cases are identified as digital transformers. The table allows us to distinguish between four significantly different technological strategies or situations: if we classify the ‘digital users’ and ‘low-users’ under one label, we have the strongest distinction between technology strategies: Total (4 cases), AI/ML (7), Robotic (5) and Low-user (14). We give four examples of how these cases are different.

NL3 belongs to the Total group and is an example of a company investing in all types of technology. The company sees technology as an important means to deal with customer demands. Internal logistics and production activities have been automated to the highest degree. To use technology in all operations, NL3 avoids being dependent on external technology suppliers: all software that drives robots and other tooling has been developed internally.

GE1 is transforming into a major digital services company and sits in the AI/ML category. To optimise its logistics operations, it has mapped in great detail the geographical characteristics of the whole region where it delivers its product. This allows very precise planning of deliveries and response to the very diverse customer demands. Machine learning tools and planning software have been the cornerstone of this strategy.

ES3 is a producer of heavy tooling requiring the highest precision and performance: a Robotic company. To achieve this performance, the company needs robotics to assist in precision manufacturing, and big data analytics to understand the production processes and the maintenance of its products once delivered.

BG5 is a small software developer which is unable to pay the high wages the other software developers pay and relies on sufficient new talent to support its further development. The company uses a set of standard software tools to deliver to its customers. Even though the type is not as advanced as the three other types, these companies rely on many digital competencies of their personnel.

The four cases represent the variation in technology strategies. **NL3** is a high-tech company with robotics, AI and machine learning featuring in all its operations. **GE3** is mainly focused on using AI and machine learning for its delivery strategy. **ES3** uses robotics and big data analytics to assist its precision manufacturing. **BG5** is a software supplier to a whole range of national customers.

Technological transformation and workplace innovation practices

In this section, we follow the analytical approach described earlier in the chapter.

Prevalence of digital technology type

Table 2.7 shows the prevalence of organisational and technological practices among the company cases.

Table 2.7 Prevalence of organisational and technology practices (n=28; 2 missing) (n (% per company type))

	Type of digital transformation			
	Low-user	AI/ML	Robotic	Total
1. Low investment, low involvement (low-low)	4 (31%)	2 (33%)	1 (20%)	
2. Moderate investment, irregular involvement (moderate-irregular)	2 (15%)	1 (17%)	1 (20%)	
3. Selective investment, moderate involvement (selective-moderate)	2 (15%)	1 (17%)	1 (20%)	
4. High investment, high involvement (high-high)	5 (38%)	2 (33%)	2 (20%)	4 (100%)

The table shows that the company cases are spread across all technology types and organisational practices, except for the Total technology type. The Total type are found only with high investment, high involvement practices, which suggests an association between organisation and technology practice.

We can point to the case of NL3, in which the company invests in comprehensive and permanent training of all of its personnel to deal with all the technologies it invests in. Every person in the company has a technical coach. NL3 is focused on attracting more VET-level personnel from all parts of Europe. Half of the employees do not have Dutch nationality. The use of technology requires a dedicated strategy for personnel.

Low investment, low involvement practices reveal cases of Low-user technology similar to those of AI/ML, but more than Robotic and Total cases. The moderate-irregular and selective-moderate practices show a spread of technology types. All TOTAL cases display high investment, high involvement practices. Even though there is quite some spread in technology types among the organisational practices, it seems that the more technology-focused companies are supported by more high investment-type of organisational practices.

Comparing the motives for digital transformation

The motives to invest in digital technologies can shed light on the demand for organisational practices. The FLASH-Eurobarometer identifies eight possible motives. The interviews with the case companies uncovered two additional motives: to develop new business models and to serve the customer better. This last motive has been integrated with 'quality'. The cases have been asked

to rank-order their motives from 1 to 6, with 1 as the most important priority rank. If cases did not rank a motive, then this motive was rated as 6. Table 2.8 shows the average rank scores for each organisational practice type.

Table 2.8 The priorities of the cases according to organisational type (n=26; 4 missing)

	Low-low	Moderate-irregular	Selective-moderate	High-high
N=26	6	4	3	13
Labour costs	4.8	3.5	4.0	3.3
Higher production	3.1	2.2	2.3	3.2
Work less physically demanding	4.3	5.2	4.3	4.0
Work mentally less demanding	3.6	4.5	4.3	4.3
Quality/better serving the customer	3.5	1.7	1.3	1.3
Image stakeholders	4.8	3.7	4.6	4.4

Quality and better customer service are the most important motives for the moderate-irregular, selective-moderate and high-high organisational types. Only for the low-low type, this is not the most important motive. Higher production is the most important motive for the low-low organisational type, and rates as high in the other organisation types. The table shows that the low-low type has no clear preference; all motives rate above 3. This aligns with the idea that such companies do not invest strongly in their organisational practices. The other organisational types are much clearer in their priority. The focus for these companies is more on the customer, which requires more investment in organisational practices.

Barriers to investing in digital transformation

The comparison of barriers to investing in digital transformation between organisational types adds extra information on organisational issues. The FLASH-Eurobarometer identifies eight possible barriers to introducing digital technologies (Table 2.9). One extra barrier was added after analysing the cases: the availability of sufficient personnel.

Table 2.9 Responses to question 'In introducing digital technologies, have you been confronted by the following barriers to digitalisation?' (n=30; none missing)

	Low-low	Moderate-irregular	Selective-moderate	High-high
N=30	6	5	4	15
Financial	2		2	5
Skills	3	2	1	5
Managerial skills	1	1	1	1
IT infrastructure				2
Regulatory obstacles			1	2
IT security issues	2	4	1	4
Uncertainty regarding digital standards				3
Internal resistance	1	1		5
Personnel availability	1			

Four companies did not report any barriers to implement digitalisation. For low-low cases, skills (of employees) are the most reported barrier to digitalisation. Financial resources and IT security issues are an issue. For the moderate-irregular cases, IT security issues are an important barrier. Financial resources are most cited for the selective-moderate type, but a clear picture of barriers does not arise. For the high-high group, three main barriers are cited: financial resources, skills shortages and internal resistance. The last barrier is important because it is precisely the 'voice' factor that is characteristic of this type of organisation. Internal resistance is allowed and is present in these cases. One of the cases indicated that older workers did not want to change over to the newest technologies. Company management discussed with them how to make better use of their current capabilities.

Organisational Practices to Manage Skills

The technological and organisational transitions affect the skill use of employees in the cases. The way the case companies describe how they deal with skills can indicate how technology and organisation relate to one another. High-high companies are expected to make better use of skills. The context is that almost all cases employ personnel with academic and technical skills. Most cases work with a workforce that possesses advanced digital skills. The

challenges for all these cases are attracting new talent and keeping skills up to date. In dealing with these technical and digital skill demands, the cases use very specific organisational, recruiting and training methods, or have changed these measures over the past years. Most companies have shifted their recruitment demands upwards, in line with their perception of upskilling demands. This pushes companies to broaden their recruiting areas and invest heavily in internal training systems. All (27) of the cases report that they need to continuously train new and current employees to keep up with the technological and digital changes. All employees, even managers in all cases, need continuous retraining to deal with the ever-changing technologies.

The four organisational forms approach the employees' skills and the challenges of digital transformation differently. A part of this has already been touched upon in Table 2.3. The question is how different the approaches to skills really are.

The low-low company practices of ES1 and GE5 were previously described in Table 2.3. Practices at GE3 resemble those of GE5, but the skill level is very different. GE3 is a start-up in the logistics domain. It relies heavily on its AI/ML technologies for its delivery service. The profit margins are thin, and the only way to win in the market is to secure timely and on-demand delivery. The company is highly dependent on the skills of its developers. For this purpose, the company has broadened its recruiting base to other countries. The current workforce is 100% suited to the task, but there are too few of these specialists. The company does not yet have well-founded personnel policies. A lot of personnel decisions are made on an ad hoc basis. These low-low companies expect to find directly productive employees. In GE5, this is achieved by reducing the learning time of new drivers. Technology is used in support of the organisational model. Training and on-the-job learning are undertaken within the company itself. ES1 limits recruiting time by strictly relying on referrals. New candidates need to bring high-level experience. The company has no capacity to start training employees for new tasks. As far as specific training is concerned, it remains mostly training on the job. BG5 reports that it uses a system of internships to find the right talent, but once selected, these interns switch over to on-the-job training.

For comparison, we use the practices of the high-high cases as a reference point. The high-high case NL3 only recruits academically schooled personnel, mainly from countries they expect are not in the recruiting areas of their main competitors or customers, such as Iceland and Bulgaria. The growth of the high-high case FI1 is limited by the need to find sufficient talent. To do so, FI1 recruits far over the borders and manages inclusive personnel policies to guar-

antee multicultural and multinational workforces. FI1 has special services for foreign employees and their families, coming from 40 different countries. GE3, as a moderate-irregular case, has followed the same strategy: first trying to use the local talent, then shifting towards talent coming from the German capital, and now looking at the international scale. However, some companies do not follow this path, rather continuing to recruit any talent they can attract and then training these employees to perform the right tasks. ES2 and ES3, both examples of the moderate-irregular type of companies, recruit students from the local VET schools and then train them. ES3 indicates that they are forced to do this since the machines they use are so complex that no school system can prepare the workers for such tasks. BG4, in the same category, recruits any person with data skills and then retrain them to understand and use the technologies they use in the company. It cannot afford to be overly selective.

The training systems in these high-high cases vary quite significantly. However, central to the training systems is the fine-grained approach to follow-up the skills of their employees. The last step in developing their training systems is the possibility of using self-training systems. For example, the high-high case FI1 starts from the current skill set of the employee/applicant, for each position in its processes. If the person has the skills FI1 needs, FI1 adapts the work process and working environment according to the needs of the employee. NL3 goes even further. It uses a very extensive training system in which a resource and responsibility matrix is used to monitor changing skill levels. This provides a 'living CV' for each employee, which shows which skill levels a person controls and what ambitions a person has, so they know what they want to develop, and what topics they can train themselves in. NL3 lets new employees start from their talent to grow into specific processes and workflows. The idea is that the employee becomes involved in specific (technology/product) programs and then can apply the competencies. 'Coaches' ensure that employees develop their competencies in both directions. GE1 reports using an apprenticeship model, with walk-in-training of new talent guided by experts. FI2 keeps the knowledge of all employees updated through an online academy specifically developed to achieve a situation where all workers feel knowledgeable about using digital technologies at work. Organisational measures (e.g., cross-organisational workstreams) are applied for this purpose. The deployment of digital technologies is linked to the workplace innovation practices the plant has implemented. These high-high cases support these training systems with team- or project-based organisational models and flat hierarchies. BG2, a selective-moderate case, has developed an internal academy specifically for training. It even engages external consultants to come in and train the new colleagues. Most of these cases are shifting training to self-training systems in which personnel need to keep updated with online or e-learning modules.

The main difference between companies is how they monitor employee skill development.

Discussion and conclusion

The key questions in this chapter are: what is the connection between digitisation and organisational practices? Does a company that chooses to digitise benefit from workplace innovation? The research focuses on 30 cases, half of which can be classified as workplace innovation companies. The prevalence of digital technologies is high in all cases but highest in these workplace innovation companies. This is not surprising because the cases are selected on the prevalence of digital technology. However, it was not clear beforehand which digital technology this would be and whether it fits within the company's digital strategy. In the end, 19 cases were classified as digital transformers.

What do our research results tell us? Digital technology is used in low-low companies. In these cases, digital technology is used as a management tool. Algorithms help to reduce the complexity of the work of the employees. The cases organise the work in such a way that a high turnover of personnel is considered. The knowledge of the employees lies in the technology itself. Think of the knowledge of the delivery area at logistics providers: every square metre of the delivery area is in the software. In other low-low cases, there is simply a lack of development strategy for the employees. There, the new employees must be immediately employable. There is no time to develop knowledge. This kind of staff deployment is risky because the departure of one person can immediately frustrate the growth ambitions of the case company. The lack of a development strategy further limits the growth of this type of company at the outset.

Among the high-high type of companies, we see more applications of digital transformation strategies. Although all companies, including the low-low companies, report staff shortages, digital transformation strategies require a lot of new knowledge and skills. Most cases focus on recruiting academic, technically skilled staff, but this is not always the case. There are several companies with VET employees who survive on the digital frontier. All 30 companies indicate that they have to source their talent from further and further afield. Recruiting on an international scale is an issue even for very small companies.

However, recruiting on an academic level only is the specific choice of companies. It is not a choice that is necessary to be successful. More important is

the development perspective that the companies offer to existing and new staff of all education levels. Only the low–low cases employ unskilled or low-skilled staff, and they limit this staff's training opportunities and development perspectives. Especially in workplace innovation cases, there is no single strategy for developing existing and new knowledge. Instead, the cases apply a broad set of measures. It is striking that these high–high cases go to great lengths to map all the available knowledge to organise new development paths based on this knowledge. An important organisational context here is that these organisations should not be overly hierarchical. The cases show teamwork and project-driven work as models.

Workplace innovation cases let employees play a role in shaping the digital transformation. The fact that these cases identify employee resistance as an obstacle to transformation does not limit opportunities for digitalisation. The opinions of the employees are channelled into improvements in the organisations. Apparently, criticism is not punished, but staff are stimulated to speak up to improve learning and innovation (Edmondson & Harvey, 2017).

The cases come from six different countries and different institutional contexts. These contexts have an impact on business practices. Especially for the Bulgarian cases, it is clear that the input of the employees in the companies is not organised. Employees should take the initiative themselves to offer their opinions. What is visible in that context is that in three companies, employees would rather leave the company than express their voice. The turnover rate in Bulgarian companies is high (between 16% and 50% per year), despite the higher pay rate compared to other sectors.

The digital transformation does not lead to reduced staffing requirements or even plans for staff reductions in any company. On the contrary, all companies need staff growth to keep up with demand for products or services. We do not fully understand whether these companies' growth is at the expense of jobs at competitors in the sector. None of the companies sees digital transformation as a threat. On the contrary, they need this transformation to meet the quality demands and wishes of their customers.

Organisational policies help companies gain the most out of their employees: some do this better than others. There are still large differences in practices, indicating that even for most workplace innovation companies, there are still opportunities to develop and better use their staff. The choice of measures – and thus the opportunities to make better use of technology – depends on how much employees can participate. The situation in Bulgarian companies is that

they are experimenting with all kinds of measures, but there is no employee participation. There is still a world to be won in that context.

The 30 cases remain a biased sample. As a result, the external validity of the results is limited to digital frontrunners. The material shows that not only technology but also the organisational context must be included in understanding the effects at the employee level. In broad surveys, more attention should be paid to workplace innovation as a driver of digital transformation.

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