

BARMETAL



Digitalization, Automatization and Decarbonization: Opportunity for Strengthening Collective Bargaining in the Metal Sector

Slovakia Policy report

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Introduction

The emergence and intensification of the so-called dual or twin transition, referring to digitalization and the green transition, increasingly exposes European countries to challenges in adapting to these processes. One of the relevant emerging challenges is the effect on the labour market, because technological change increases the risks of labour and skills shortages and can facilitate a greater mismatch between labour supply and demand (Studená et al. 2023). At the same time, technological change facilitates job upgrading and secures competitiveness of the concerned industry in the future.

As part of transition trends, automatization, digitalization and decarbonization (hereafter DAD) of production and their effect on the labour market are receiving increased attention by policy makers and researchers. To contribute to this debate, this report analyses how the key challenges related to changing workplaces and working conditions due to DAD are addressed in collective bargaining both at the workplace and sector levels in Slovakia. The report is part of the BARMETAL project (*Digitalization, Automatization and Decarbonization: Opportunity for Strengthening Collective Bargaining in the Metal Sector*) analysing the same trends across 12 countries and at the EU level.

The case of Slovakia is relevant for analysing the impact of DAD on the labour market as the Slovak economy is highly industrialized with a leading role in the manufacturing industry, and automotive sector therein. This is the sector with highest pressure to transform and adapt to new technologies; and Slovakia faces the highest risks of skills shortages emerging from automation and digitalization in Europe (Machlica et al., 2017). At the same time, the transformation process may generate a strong disruptive impact on local labour markets (Majzlíková and Vitáloš, 2022). This brings specific challenges and needs to individuals and companies that need to absorb this change with skill adaptation being at the core.

Research on how collective bargaining responds to DAD challenges is scarce yet highly relevant. Collective bargaining is a flexible yet binding governance process that can address the effects of technological transformation at company and workplace levels gradually by implementing training measures, or risk-mitigating working time adjustments (c.f. Eurofound 2021). The identification of main opportunities for collective bargaining emerging from DAD are thus particularly important research themes.

The metal sector in Slovakia is highly organized with established collective bargaining at the sector and company levels. The current report examines the **state of the art of collective bargaining in the metal sector** covering the automotive industry in Slovakia, and **opportunities for strengthening collective bargaining in conditions of technological change** that DAD resembles.

The conceptual and methodological approach informing this analysis derives from the framework adopted in the BARMETAL project. The broad framework refers to the multi-level governance perspective (c.f. Keune and Marginson, 2013) that acknowledges the activity of social partners across national, sectoral and company levels, as well as the interconnections and interactions of how DAD is thematized and addressed via bargaining at these levels. The analysis focuses on the technological change occurring in the automotive/metal industry through the lenses of collective bargaining at the *macro, meso and micro* levels (Kochan et

al., 1986; Katz et al., 2003). The expected effects of DAD on social partner actions, in particular collective bargaining, can be categorized according to various governance levels (see Table 1).

Table 1. DAD and collective bargaining: levels of analysis

Levels	Level of action	Main issues of contention	Forms of union intervention
Macro-level	National, Political, Macro-societal	Public policies Definition and administration of state-enforced rules governing ER (e.g., labour law, minimum wage)	Social dialogue / concertation; lobbying; campaigning; contestation (e.g. general strikes)
Meso-level	Sector Industry	Pay levels & pay increases for different professional / skills profiles; common ground rules for competition & work organisation within a sector	Sectoral collective bargaining; campaigning; recruitment; contestation (e.g. sector-wide strikes)
Micro-level	Workplace Company Local Territorial	Work organisation, working time, control / autonomy, internal labour markets / promotions, remuneration, bonuses / benefits...	Firm-level bargaining or work councils; recruitment/organising; contestation / strikes; informal resistance

Source: the authors based on Gaspari and Tassinari (2020)

The analysis draws on various sources of empirical data: a) desk research on the regulatory efforts of DAD and social partners' efforts to address it; b) primary data collected through semi-structured interviews with social partners and other key stakeholders in the automotive sector; and c) interviews within selected case companies and observations made by one of the authors at workplaces at various automotive companies during previous research conducted in 2022. An additional source of original data are interviews conducted by one of the authors in 2022 on workers' training and development due to skills shortages in the metal sector in 2022. The authors have requested permission from the respondents of these interviews to use these data also for the purpose of the current report (Interviews coded SK10-SK16) .

Table 2 shows the list of interviews. All interviews were conducted by the authors, in Slovak, in person or online. All interviews have been recorded and transcribed upon the respondents' agreement. In case of non-agreement, detailed notes were taken by the authors during the interview. The scope of interviews covers the variety of actors involved in DAD processes from the labour market perspective, including the representatives, of central and regional governments, sector-level trade unions, employers' associations, managers and workers' representatives at the company level, and the implementation agency of the Ministry of Labour, Social Affairs and Family as well as an educational institution closely cooperating with the largest automotive producer. With a dynamic advancement of policy action regarding the technological transition in Slovakia, the regional level emerged as important for analysis, in addition to the national, sectoral and company-level analysis derived from the project's conceptual framework.

Table 2. Overview of semi-structured interviews in Slovakia

Interview Code	Type of organisation	Position of the respondent	Interview date
SK1	National institution for VET and LLL (ŠIOV- štátny inštitút odborného vzdelávania)	Director	28/06/2023
SK2	Ministry of the Economy (Ministerstvo hospodárstva SR)	State Advisor on Industrial Policy	23/06/2023
SK3	Ministry of Labour, Social Affairs and Family (Ministerstvo práce, sociálnych vecí a rodiny SR)	Director of the unit dealing with labour offices' coordination and educational programmes (Odbor politiky trhu práce, sekcia práce)	04/07/2023
SK4	Implementation agency of the Ministry of Labour, Public Employment Services (Ústredie práce, sociálnych vecí a rodiny, ÚPSVaR)	Director of the unit dealing with labour offices' coordination and educational programmes	04/07/2023
SK5	Regional governance committee	Member of Monitoring Committee for Just Transition, Representative of trade union	12/06/2023
SK6	OZ KOVO Trade union – sectoral level	Metalworkers trade union president	30/06/2023
SK7	Trade union – sectoral/regional level	Regional representative, Member of Automotive Committee	20/06/2023
SK8	Company 1 - employer	Head of HR	23/06/2023
SK9	Company 1 - trade union	Company Representative	15/11/2023
SK10	Company 2 – trade union	Company Representative	08/11/2023
SK11	Association of industry federations and transport (Asociácia priemyselných zväzov a dopravy, APZD) – employers' association	Labour law expert and member of the sectoral committee	24/01/2022
SK12	OZ KOVO Trade union – sectoral level	Metalworkers trade union president	17/01/2022
SK13	Implementation agency of the Ministry of Labour, Public Employment Services (Ústredie práce, sociálnych vecí a rodiny, ÚPSVaR)	Deputy head of employment services unit	20/01/2022
SK14	Ministry of Labour, Social Affairs and Family (Ministerstvo práce, sociálnych vecí a rodiny SR)	Director of the unit dealing with labour offices' coordination and educational programmes	27/01/2022
SK15	Company 3 – reference/benchmark for case study companies 1 and 2 - employer	Head of staff development and vocational education	28/01/2022
SK16	Education institution for vocational education – (Duálna akadémia)	Head of vocational training	27/01/2022

The empirical analysis in this report acknowledges two dimensions: a general/sectoral analysis; and company-level case studies. The focus of the analysis is on bargaining procedures, outcomes, and proposed bargaining adaptations in response to digitalization, automatization and decarbonization. Two company case studies were identified, while a third company serves as a shadow case without the same extent of original data collection. In the first case study, the company serves as a manufacturer of end-use vehicles, selected for its significance in the context of ongoing automation, digitalization, and decarbonization efforts that can be observed both in product (electrification) and process components (greening of the factory). The second company, operating as a supplier with a distinct portfolio that is not subject to electrification processes. Despite this, it has positioned itself as a leader in the implementation of digitalization solutions for optimization and R&D within their specific domain of production. The focus on both the sector and company level, also acknowledging national government-level discourses, allows placing the trends in DAD and their impact on collective bargaining in the context of multi-level governance.

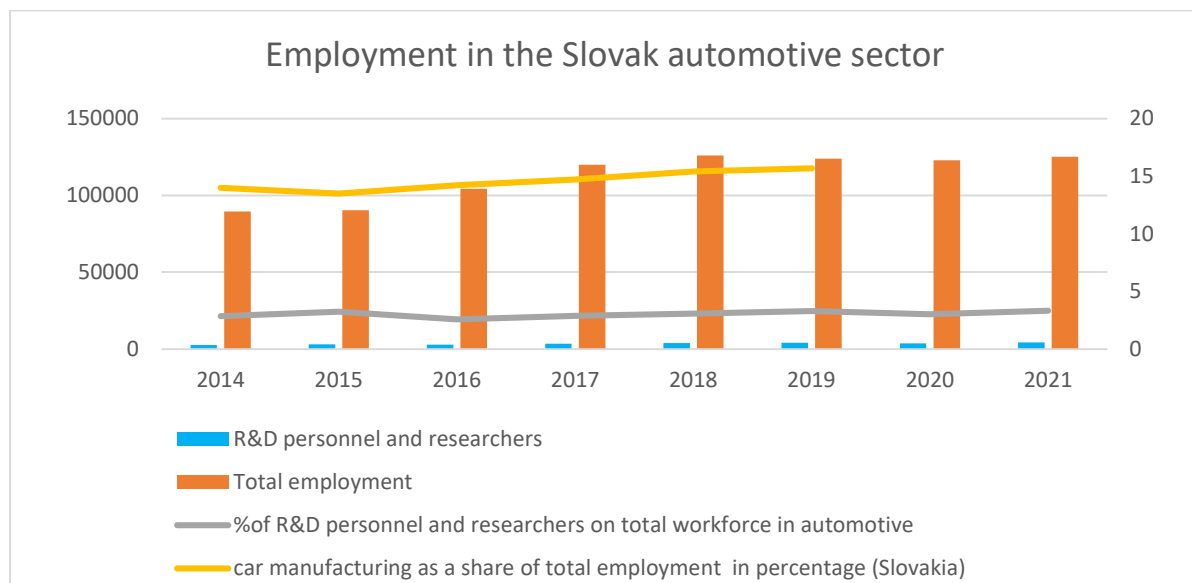
1. Labour market in the metal sector

Slovakia is a small open economy characterized by an export-led growth model where the economy is dominated by foreign multinational corporations controlling the majority of industrial ownership (Bohle and Greskovits 2012, Ban and Adascalitei 2022, Kahancová and Staroňová, 2023). Automotive manufacturing became the flagship industry in Slovakia's economic model. It is the most important division of the metal sector with a 50 percent share on industrial production, 13 percent share on GDP, and 25 percent share on all jobs in the industry (SARIO, 2021). 97.9% of companies in automotive manufacturing are of foreign ownership and generate up to 99% of turnover, production value and value added of the whole sector (Pavlínek 2023, Eurostat, fats_g1a_08).

As automotive production rapidly grew during the 1990s, foreign automakers that relocated their production into Slovakia attracted upstream industries (for example parts suppliers) and created spillovers. Slovakia has become “the assembly platform” integrated in a highly internationalized globalized automotive sector but with a low value and a less skilled workforce (Pula, 2018). Such a model based on cheap labour resulted in lacking pressure on social investments and innovation. In fact, despite a rapidly growing industry, Slovakia's relative position in the European automotive industry has been among the weakest due to very low level of innovation activities. Compared to the size of the industry, Slovakia has one of the weakest R&D capacities in terms of R&D business expenditures (0.33% of the total value of production in the automotive industry compared to 7.06% in Germany) and the number of R&D personnel and researchers employed (1.52% of total employment in automotive compared to 16% in Germany) (Eurostat, rd_p_bempoccr2).

With FDI inflow, employment in the automotive sector has substantially grown over the past two decades. Car manufacturing as a share of total employment in the Slovak manufacturing industry rose from 11.3 percent in 2010 to 15.7% in 2018, and apart from a slight stagnation during the crisis period of 2008 and 2019, the number of workers employed in the sector reached its peak of 136500 people in 2022 (see Figure 1).

Figure 1. Job growth in the automotive sector



Source: the authors, based on Eurostat (sbs_na_ind_r2, rd_p_bempoccr2)

The jobs in automotive manufacturing are stratified along the production and supply chains. Thus, statistics showcase much direct employment meanwhile the total amount is significantly higher due to number of ‘hidden jobs’. Currently, there are 177 000 of people being directly employed by four car producers and Tier 1 suppliers, while other 98 000 employees work in the lower Tier and other intertwined production sites (SARIO, 2021). Therefore, about 275 000 people in total are directly and indirectly employed by the automotive industry in Slovakia.

Slovakia specializes in export-oriented production so it predominantly functions as a production hub with a high number of manual labour jobs and significant labour and skill shortages. According to the skill composition ratio in manufacturing indicated in Table 2, automotive manufacturing in Slovakia continues to employ predominantly medium skilled workers: 73 % of jobs in automotive are medium skilled, 8% are low and 19% are high-skilled. While the general trend in skill groups aligns with those in Germany, there is a 15% difference in the of share of high skilled jobs, which serves as an indication for lack of lacking high skilled labour in Slovakia.

In 2021, The Slovak National Bank forecasted the effect of technological/structural changes to jobs in Slovakia already as follows: by 2030, the ratio of productive and post-productive workers will shift to 3:1 from the current 5:1, while 62% of current jobs are affected by a potential risk of robotisation (NBS 2021). 10 % of jobs are expected to be replaced by robots; and 20-30 % of jobs shall be affected by digitalisation and green transition, especially in the automotive industry.

These evolving trends carry significant implications for labour demand, consequently impacting the priorities in collective bargaining. First, an estimated 30% of jobs will increasingly require higher skill sets, while the demand for low-skilled workers is projected to decrease. Second, about 40% of future jobs are expected to emerge in yet-to-be-defined sectors. Additionally, there is a potential for heightened brain drain among the highly skilled workers (NBS 2021). These projections underline the necessity of adapting collective

bargaining strategies to align with these anticipated shifts. Themes of worker training, re-skilling, up-skilling, fostering digital competencies, and implementing measures aimed at enhancing job security and employability have only been emerging slowly as subjects of collective bargaining in the past decade.

Table 3. Skills composition in manufacturing

	High-skilled (2012-2022)		Medium-skilled (2012-2022)		Low-skilled (2012-2022)	
	Germany	24 %	34 %	63 %	56 %	13 %
trend	↗		↘		↘	
Slovakia	19 %	19 %	70 %	73 %	11 %	8 %
trend	No change		↗		↘	

Source: The authors based on Eurostat *lfsa_eisn2*

The current skill shortage is a function of a long-term ineffective educational system intensified by demographic trends and utilization of local labour market (a high ratio of auto companies per active labour force). While Slovakia has one of the highest number of schools and universities per capita, the performance of Slovak students in international educational rankings has been deteriorating. This suggests an increasingly poor quality of education for young people. The r, which may have implications for the skills mismatch between school leavers and labour market demands. Results of 2022 PISA testing that measures a 15-year-olds' ability to use their reading, mathematics and science knowledge and skills to meet real-life challenges ([OECD 2023](#)) point to alarmingly low scores in mathematical and reading literacy that are far below OECD average. In addition, the testing discovered that almost 75 percent of VET students belong to the risk group. In all examined subjects the influence of the socioeconomic background of Slovak students on their performance is significantly higher than the OECD average.

Due to the mismatch in skills gained in educational programmes vs the real demand of employers, companies, especially large employers including in the automotive sector, often rely on their own in-house vocational education and training for their workers. In 2020, almost 63 % of industrial companies provided training for workers (see Table 4).

Table 4. Company-provided training for employees

	Companies providing training for employees (% of all enterprises)			
	Industry		All NACE Sectors	
	2010 (%)	2020 (%)	2010 (%)	2020 (%)
Czechia	76.6	88.8	72.2	85.9
Germany	72.8	78.2	72.8	77.2
Hungary	51.7	40.3	48.7	37.7
Poland	24.1	61.1	22.5	40.9
Slovakia	72.2	62.9	69.0	58.9

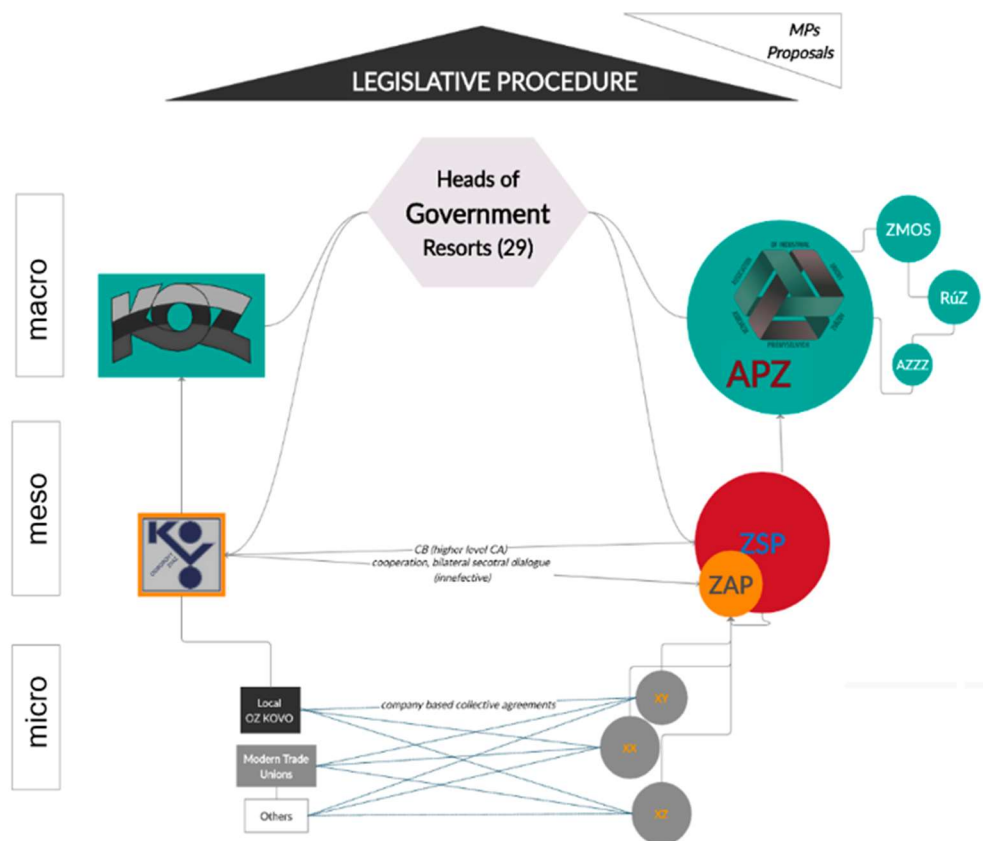
Source: the authors based on Eurostat (*trng_cvt_01s*, *trng_cvt_01n2*)

The lack of highly qualified workforce is emerging as a potential barrier to digital transformation. Based on a survey conducted by consulting company PwC in 2018, 82 % of 61 surveyed automotive suppliers in Slovakia identified the lack of available qualified workers on the job market as a risk factor affecting their future growth potential, 78 % of suppliers considered the unavailability and low quality of labour a major issue for their company, and 53 % of suppliers (up from 37 % in 2016) argued that the lack of skilled labour restricted their ability to win or accept new contracts (PwC, 2018). According to survey about the application of Industry 4.0 (Industry4um, 2023), the lack of qualified workforce is particularly high in digitalization systems solutions, robotics, analytics and data evaluation.

2. Industrial relations in the metal sector

The industrial landscape of Slovakia revolves significantly around its robust foreign investment in industry and particularly in the automotive sector. Slovakia stands out in the Central and Eastern European (CEE) region for its retention of sectoral bargaining, though coordinated wage bargaining is limited to select higher-level agreements, including mechanical engineering and the automotive sector. Figure 2 shows the structure of industrial relations actors; and these are also elaborated below in sections 2.1 and 2.2.

Figure 2. Industrial relations actors in the automotive industry



Source: the authors.

2.1. Trade unions

Despite the persisting trend of declining trade union membership, the automotive sector belongs to one of the most unionised in the country (Kahancová et al. 2019) with significant revitalisation observed particularly by the authors' fieldwork in the post-covid time period. The main stakeholders active in the system of sectoral social dialogue and collective bargaining for the automotive industry are *OZ KOVO* and Modern Trade Unions (*Moderné odbory, MO*).

OZ KOVO, a long-established metal sector union in Slovakia, holds membership of around 400 organizations across various industries, representing approximately 150,000 workers. It plays a central role in negotiating sectoral collective agreements and holds significant sway within the Confederation of Unions (*KOZ SR*), and is historically the primary union representative in the Economic and Social Committee of the Slovak Republic.

In the automotive sector, *OZ KOVO* has formed the *Automotive Commission*, involving up to twenty trade union representatives from different companies. This collaborative platform aims to strategize collectively and exchange information, though meeting frequency has reduced due to the pandemic. *OZ KOVO* acts as a vital intermediary, translating workplace concerns into legislative proposals and bridging the gap between company unions and *KOZ SR*.

In 2016, the emergence of *MO* resulted from members leaving *OZ KOVO* at Volkswagen due to disputes over unionization and services. Since then, *MO* have led collective bargaining at Volkswagen and Jaguar Land Rover, expanding their presence in other automotive companies and suppliers. This trend continued with the establishment of a new confederation — the Joint Trade Unions of Slovakia (*Spoločné odbory Slovenska, SOS*) — formally joining the tripartite committee in 2021 following government-induced representation criteria amendments.

Trade unions are present in approximately 31% of organizations, whereas around 10% of all surveyed organizations have either a works council or a workers' trustee (Benedeková et al. 2019). Remarkably, nine out of ten organizations with a trade union presence have successfully concluded a collective agreement.

2.2. Employers' associations

The estimated employers' organization density in the metal sector is around 18-20 % (Kahancová, 2016). All large automotive producers are organized in the Association of the Automotive Industry (*Zväz automobilového priemyslu, ZAP SR*), and the peak-level Association of industry federations and transport (*Asociácia priemyselných zväzov a dopravy, APZD*). While *ZAP* does not engage in sectoral collective bargaining, it provides a mandate to the Federation of Mechanical Engineering (*Zväz strojárskeho priemyslu, ZSP*) to bargaining a sectoral collective agreement with *OZ KOVO* also on behalf of the automotive industry (covering the sector denominated as SK-NACE 29). *APZD* participates in the national tripartite committee and is thus a relevant player in national-level social dialogue and government policy making.

ZAP SR is the most influential organization in the field of industrial policies, social policies, R&D and education representing more than 174 automotive employers. Yet *ZAP* has been

reluctant towards negotiating a sectoral collective agreement for the automotive sector and thus has only an indirect influence on collective bargaining in the metal industry. Over the years, automotive sector employers have built their strategies around bilateral ties with state representatives, which limited the power industrial bipartism. In 2018, APZD became member of the national tripartite council, and as a consequence, negotiations about working conditions in automotive sector shifted from sectoral bargaining extensively to national-level policy influence.

2.3. Social dialogue and collective bargaining

Legal framework for collective bargaining in Slovakia was established in the early 1990s and has undergone only minor changes since. The company-level remains the dominant collective bargaining arena. Downward derogation from collective agreements is not permitted by law, thus collective bargaining is one of the most effective tools to improve working conditions.

In the past, there have been stimuli to create multipartite sectoral dialogue across several interconnected industries. In 2013, five of the largest industry employer federations¹ and three of the largest industry trade unions² officially committed to social peace, maintaining and increasing employment and improving the working conditions of employees through social dialogue and collective agreements and established the cross-industrial platform for social dialogue so called *Industrial bipartism*. While the platform does not have strong competences, it acts as a benchmark for strengthening cooperation between social partners negotiating higher-level collective agreements. However, in the last 3 years, its role has been declining because of a new body – The Alliance of Sectoral Committees (*Aliancia sektorových rád*) that serves as a platform for sectoral social dialogue particularly addressing structural transformations emerging from technological changes in the Slovak and global economies.

Despite being one of the best organized sectors in the Slovak economy, collective bargaining covers only about 22,5 – 25% of the sector's workforce (Benedeková et al. 2019 and interviews). While there are no consistent data for the automotive sector, the 25% percent coverage of around 525,000 workers refers mostly to company-level agreements (Benedeková et al., 2019). Collective bargaining coverage in the industry is thus only a little above national average and about 7.5 % below OECD average (32.4 % in 2017).

Bargaining coverage is not increased even via collective agreement extensions, facilitated by Act 2/1991 on Collective Bargaining and subsequent amendments. Legally feasible extensions were practiced during specific the periods: 1992–2004, 2007–2010, 2014–2016, and most recently from 2017 to 2021. During the extension practice, a representative collective agreement within a sector could be extended to employers beyond those aligned with the signatory employers' association. However, a legislative amendment in 2021 nullified this provision. Presently, higher-level collective agreements only cover companies associated with the signing employers' association.

¹ Automotive Industry Association, Slovak Electromechanical Association, Union of Metallurgy Mining Industry and Geology, Association of Construction Entrepreneurs of Slovakia and Union of Engineering Industry

² Metal Trade Union KOVO, Trade Union of Mines, Geology and Oil Industry Workers - OZPBGNP, Integrated Trade Union - IOZ

Sectoral agreements set minimum standards tailored to meet the diverse needs of employers within the sector. While larger employers often adhere to these minimal benchmarks, utilizing company-level collective agreements as their primary regulatory framework, smaller entities, particularly suppliers or subcontractors in extensive production chains, encounter challenges in meeting these sectoral standards. Consequently, trade unions and employers' associations do not actively advocate for innovative changes or structural adaptations in sectoral bargaining due to these complexities. Instead, they address significant issues through alternative regulatory avenues:

- Company-level bargaining, predominantly practiced in larger private-sector companies.
- Engaging in national-level policymaking through tripartism, sectoral tripartite committees, and other similar mechanisms.

3. Digitalization, automatization and decarbonization – challenges and policy responses

Figure 3 shows a summary of DAD processes and policy responses in Slovakia. Desk research, interviews and authors' earlier research helped identify the main topics that are being thematized in relation to DAD and the labour market (and thus are relevant from the collective bargaining perspective):

Figure 3. Developments in DAD in Slovakia

Developments in DAD Comparison Chart		AUTOMATION	DIGITALIZATION	DECARBONIZATION
SCOPE	<ul style="list-style-type: none"> • 2018 SR leader in robotics thanks to automotive (532 robots per 10 000 empl. in 2021) • applied in production phase • both OEMs and suppliers (NCR, 2023) 	<ul style="list-style-type: none"> • implemented throughout administration and production processes • 1/4th of suppliers did not start with digitalization yet (ZAP SR, 2022) 	1. Electrification of production <ul style="list-style-type: none"> • all OEMs • New players (Volvo, VW, Porsche, Ino Bat) 2. Decarbonization of factory <ul style="list-style-type: none"> • mostly OEMs (financing issue) 	
EMPLOYMENT EFFECTS	JOB DESTRUCTION (X), DECREASE EMPLOYEES AUTONOMY, INCREASE THE SPEED OF PRODUCTION AND INCREASED DEMAND FOR QUALIFICATIONS AND HIGHER EDUCATED WORKERS (Martišková, 2020)			
POLICIES AND FINANCIAL FRAMEWORKS	Strategy for intelligent industry (AP until 2020), Strategy for digital transformation of SR (AP until 2022), Recovery and Resilience Plan		Just Transition Plan (no automotive), Strategy for electromobility, RRP	

Source: the authors.

Notes: RRP (Recovery and resilience plan), X (not present), AP (Action Plan)

- **Industrial transformation:** Industries heavily reliant on fossil fuels, such as manufacturing and heavy industry, need to undergo significant transformations to adopt greener practices. This transition involves retooling processes and technologies. Similar transition

is expected due to the increase in automation technologies in industry including automotives.

- **Impact on employment:** DAD can lead to job displacement or changes in job roles, particularly in industries relying heavily on manual labour. Balancing the potential loss of jobs with the creation of new roles or industries becomes crucial.
- **Workforce adaptation:** The adoption of automation technologies necessitates workforce adaptation and upskilling. The challenge lies in ensuring that the workforce is equipped with the necessary skills to operate alongside automated systems or transition to new roles.
- **Digital Skills Gap:** There is a need to bridge the digital skills gap in the workforce. Enhancing digital literacy and upskilling programs is crucial to adapt to evolving technologies and meet industry demands for skilled workforce.
- **Regulatory framework adaptation** to keep pace with rapid technological changes, requires changes in the regulatory framework ensure innovation and a national strategy in adjustments in workforce skills, e.g. via providing retraining and support schemes.
- **Public Perception of DAD and awareness of training and education:** Addressing concerns and scepticism regarding the impacts of automation on job security, quality, and human involvement in decision-making processes is essential for wider acceptance and successful implementation.

To navigate these challenges, a multi-faceted approach involving collaboration between government, industry, social partners, educational institutions and other stakeholders. Investing in education and training programs, providing support for affected workers, fostering innovation, and creating adaptable regulatory frameworks are key components in effectively managing the technological transition emerging from DAD.

3.1. Policy response – national level

Guzi et al. (2022) identified the following ongoing policy responses to DAD in Slovakia:

- Systematization of vocational education facilitates by Act No 61/2015 on Vocational Education and related amendments;
- Broad national initiatives involving various national and sectoral stakeholders (e.g., the Digital Coalition);
- Localised initiatives that currently lack systematic cooperation among stakeholders (e.g., strategies and action plans of particular Ministries, e.g. the Ministry of Labour, Social Affairs and Family, the Action Plan for Just Transition of the Ministry of Education and the Ministry of Investments, Regional Development and Informatisation) ;
- Specific action plans attached to the strategies within the above-mentioned initiatives (Strategy of education until 2030, Digital Slovakia, Learning Slovakia, Plan of Just Transition);
- Projects implemented by the public employment services derived from the above strategies and plans;

- The operation of dual vocational education (education in direct cooperation with selected employers, mostly in industry), underpinned by dedicated legislation since 2015;
- Responses of individual employers: via internal vocational training, via adjusted hiring strategies, and via cooperation with external education institutions with state accreditation (within the dual education or beyond it).

According to the Ministry of Labor (interview SK3), the systematic policy response started by a **revision of the national system of occupations** and the description of skill requirements for each occupation since 2018-2019. This effort was later systematized through sectoral initiatives of SRI (see below). As the next and related effort, the policy framework and specific plans for vocational education and reskilling have been defined. The key issue here is whether education and reskilling occur via the employer, or at the individual responsibility of the worker, in his/her free time and via direct contact with the public employment services. The most relevant piece of legislation in this regard is the **Act 5/2004 on Employment Services** and its later amendments. §47 of this Act regulates the reskilling/training of employees and acknowledges funding for employers for reskilling their employees. However, the representative of the Ministry of labour admitted in an interview that

“...[direct financial support to companies] is in fact defined as state aid, and this means that not all costs can be reimbursed to the amount as some would wish for. The employer has to participate on this entire process.” (Source: interview SK3).

The concept of ‘state aid’ is defined in Act No 231/1999 and its later amendments and refers to public money provided to private entities, thereby distorting economic competition and subject to strict regulation. Assuring that training efforts are not subject to distorting economic competition, most national-level educational support in response to DAD has been implemented directly by the Ministry of Education and its implementation agency for public employment services (*Ústředie práce, sociálnych vecí a rodiny, ÚPSVaR*) coordinating the network of regional labour offices.

Since 2014, ÚPSVaR as the implementation agency of public employment services has operated two projects supported by the European Social Fund to facilitate adult reskilling and upskilling via its **Requalification and Competence courses [Re-Pass and Kompas]** (ÚPSVaR 2017). These targeted registered job seekers and distinguished between the effort to obtain re-qualification vs. soft skills including digital skills. Following the success of these projects, in February 2022 ÚPSVaR launched a new project called **Don’t lose your job, educate yourself!** (*Nestrašť prácu, vzdelávaj sa!*). The key difference to the previous projects Re-Pass and Kompas is that it (a) does not only target the registered unemployed, but anyone involved in the labour market including employed and self-employed persons; and (b) it aims to reimburse reskilling and education for individuals where their needs are related to digitalisation, green transition, and professions with reported skills shortages.

The interview respondents highlighted that the shortcoming of this scheme is that the decision to respond to technological change is fully left to the discretion of the individual worker concerned, without a systematic counselling and/or coordination with employers.

Employers express a sense of being unsupported by the state in addressing skills gaps. As a consequence, they heavily rely on internal training policies, which in turn disadvantages

smaller enterprises. Another issue arises from the lack of feedback and interaction between employers and public employment services, affecting the effectiveness of these services. Moreover, employers have limited participation in the implementation phase of national policies related to lifelong learning and educational reforms. This limited involvement impacts the effectiveness of these policies.

3.2. Policy response – sector level

At the **sectoral level**, a crucial step forward in enhancing the national response to skills adjustment and aligning education with labour market needs is the implementation of **Sector-Governed Innovations (Sektorovo riadené inovácie, SRI)**. Introduced in 2019 and supported by the European Social Fund (Vantúch 2019), SRI continually adapts the national occupational system mentioned in interview SK3. Within this initiative, 24 Sectoral Committees emerged as independent professional associations of experts voluntarily monitoring sector-specific labour market needs. Their role includes integrating these needs into lifelong vocational education and training systems (SRI 2022). These Sectoral Committees bring together Ministries, employers' associations, trade unions, and educational institutions to collectively identify key sectoral challenges and propose policies addressing them until 2030. The Alliance of Sectoral Committees serves as the overarching organization, consolidating strategies identified across the 24 individual sectors. Both the government and the interviewed employers' associations and trade unions regard these sectoral committees as effective and well-operating entities (background material for Eurofound 2022).

An institutionalized initiative involves the establishment of the **Alliance of Sectoral Committees (Aliancia sektorových rád)**, organizing 24 Sectoral Committees that serve as independent professional bodies comprising sectoral experts. These committees voluntarily oversee sector-specific labour market needs and integrate them into lifelong vocational education and training (SRI 2022). Together with Ministry participation, social partners, and educational institutions, these Committees collaboratively identify and anticipate skills requirements for respective sectors and occupations up to 2030.

3.3. Policy response – regional level

The regional level is not a key level of action of social partners in the multi-level governance structure of Slovak policy making and social dialogue. However, in relation to DAD, the regional level emerged as a relevant one, because certain automation and decarbonization challenges are being addressed at the regional level. These derive from Slovakia's Action Plan adopted in November 2020 in response to meeting the EU's targets towards green transition. Four regions in Slovakia with coal mines and other climate-intensive industries like steel, chemical and mechanical engineering, were identified for transformative measures of re-skilling and structural changes. These include the regions of Trenčín (particularly, Horná Nitra, the largest coal-mining area), Banská Bystrica, Košice and the capital Bratislava. The state decided to stop subsidising coal mining in 2023 and has invited stakeholder cooperation to determine the economy and labour market structure in this region going forward.

These regional just transition committees are organized in the form of multi-stakeholder dialogue, including trade unions. According to interview SK5, trade unions criticise the fact that they were not systematically involved in these regional initiatives and that the selection of actors at the regional level was rather unsystematic, leaving large and recognized

stakeholders out of national social dialogue aside. Trade union involvement was ad hoc after the OZ KOVO union uncovered the possibility for unions to join these regional committees. A union representative is thus part of such a regional council and claims their role is not in policy making, but rather in evaluating individual projects proposed by particular companies and/or organizations for meeting DAD targets and eligibility for public financial support. From the collective bargaining perspective, the regional level's importance is currently marginal.

3.4. Social partner involvement in DAD-related policy responses

Over the past few years, social partners have been increasingly engaged in addressing the effects of DAD (SK1, SK3, SK4). However, a strategic systematic involvement of social partners in the mentioned policies and action plans cannot be documented. Moreover, beyond tripartite social dialogue, social partners are involved in several national and sectoral initiatives that serve as platforms bringing together various stakeholders. One of the new key national platforms is the **Digital Coalition** (*Digitálna koalícia*) – the National Coalition for Digital Skills and Jobs in the Slovak Republic. It is the national partner of the European Union's Digital Skills and Jobs Platform. The coalition has 84 members, including Ministries, peak-level social partner organizations, education institutions including schools, universities and adult learning and vocational education companies, as well as private companies working in the digital economy. The Coalition sets particular goals for all members, with the overall goal to increase digital literacy in the country, thus not only addressing labour market needs. Peak-level employers' associations and the Confederation of Trade Unions of the Slovak Republic (*Konfederácia odborových zväzov SR, KOZ SR*) belong to the founding members.

Trade unions' contribution to addressing the impact of digitalization on the workforce is currently underdeveloped, but the role of unions is increasing with a greater awareness of just transition and structural labour market changes in Slovakia's key industries. Union responses are rather top-down, concentrated at the strategic level of trade union hierarchy. Unions are trying to (a) raise awareness among their members on the relevance of digital skills via events and webinars, (b) influence national policies via their access to policy making, and (c) anchor the right to education/training/reskilling for all workers due to structural labour market changes in higher-level collective agreements.

The view of unions contrasts with the that of one of the peak-level industrial employers' association, notably the Association of Industry Federations and Transport (*Asociácia priemyselných zväzov a dopravy, APZD*). APZD claims that the right to training and education needs to be addressed on a flexible basis at the company level instead of in sector-level collective agreements.

At the sector level, **social partners are involved in the sectoral committees** that are part of SRI. The interviews conducted by the authors show that both the government and employers' association and trade unions consider the sectoral response via these committees adequate for the overall skills adjustment mechanism. However, they are concerned with the fact that sectoral committees are, from a funding perspective, treated as projects for a defined period of time. They also question how such an effective mechanism of stakeholder cooperation for the Slovak labour market can be maintained beyond a single project and become a stable long-term structure for collective decision-making. The next section offers a greater insight into policy responses of one of the sectoral councils – in the electrotechnical industry, being significantly affected by digitalisation and also green technologies.

At the bipartite level (KOZ SR and employers' associations) just transition is not discussed at all. Within the tripartite dialogue, only the effects of the transformation were addressed – such as, for example, the energy crisis and its effects on plants and inhabitants. There are no institutionalized solutions regarding the expected effect on workers, and ad hoc instruments based on EU funding are being developed.

Regarding other ways of social partner involvement in DAD, OZ KOVO joined the *Just Transition Campaign* implemented by IndustriAll Europe. To spread the awareness of the current issues and at the level of KOZ SR, analytical material on Fair transformation is currently being prepared on a project basis.

Finally, OZ KOVO created a platform for OZ KOVO union dialogue in transforming sectors. The members are the heads of the OZ KOVO member unions from the company level in the automotive, glass, metallurgy and bus transport sectors. However, the OZ KOVO representative admitted in interview SK6 that the **awareness of the transformation (e.g. the effect on the labour market and social status of workers) among both workers and unionists is relatively low.**

Beyond the above initiatives with social partner involvement, there is a **lack of systematic stakeholder dialogue and even less social dialogue at the sector level** in relation to DAD. In response, most efforts by social partners are decentralized and where stakeholder cooperation evolves, it is between the individual employers and the organizations that they partner with. Especially large multinational companies developed company-specific reskilling programs, and/or engage in long-term collaborations with external vocational institutions. In addition, large employers, particularly in automotive and electrotechnical industries, use public services for simplified hiring of skilled workers from third countries.

4. Collective bargaining responses to digitalization, automatization and decarbonization

The DAD policy responses create opportunities (and challenges) for collective bargaining due to a shared interest and intensive thematization of DAD in relation to workers' education and requalification.

Despite the lack of sector-level collective responses to address DAD-related challenges, the authors' analysis identified two emerging practices both in sectoral and company-level collective bargaining:

- Workers' protection in case of redundancy
- Workers' rights to training and re-skilling in the light of digitalization and technological transformations

Nevertheless, **negotiated stipulations in response to DAD are only slowly penetrating the bargaining agendas.** Mostly, bargaining is still about wage stipulations and supplements, and working time organization (including measures on short-time work during Covid-19 and working from home in a few collective agreements). The role of collective bargaining for establishing benchmarks or becoming a key regulatory tool addressing structural changes is still limited.

There is no single sectoral collective agreement for manufacturing, but the automotive companies have been covered by the higher-level collective agreement for the mechanical engineering sector negotiated between OZ KOVO and ZSP SR. This is one of the very few sectoral agreements that introduces sector-level wage stipulations. However, given that working conditions in the automotive sector generally surpass the industrial average, sectoral wage-related clauses only yield a marginal impact on the automotive companies. Besides wages, the agreement addresses the issue of employability and adaptation to structural change by introducing a broader scope of reskilling conditions. In article no. 15, both parties of the employment relationship commit to constantly develop relevant qualifications. If jobs are eliminated because of the introduction of new digital technologies into the production process, workers shall be primarily provided with the possibility of retraining and are assigned to another job position within the organization upon an agreement with management. Moreover, the negotiated sectoral agreement strengthens the anticipation of changes on the company level as it includes the right to negotiation beyond the scope guaranteed by Labour Law. The employer is obliged to consult unions and negotiate effects on employees, in case of a changed economic situation or introduction of new technologies, particularly if the implementation leads to job destruction (Art. no. 8).

Trade unions in general support employer-driven training but advocate for embedding the right to retraining and vocational education in collective agreements. Presently, only two of seven higher-level collective agreements in industrial sectors include provisions for workers' education due to labour market changes driven by green transition, digitalization, and automation. Within the framework of sectoral collective agreements, unions tried to enforce the right to training in connection with technological changes (digital and green transformation). Nevertheless, in a certain minimalistic form, the right to training is stipulated in some sectoral collective agreements.

An emerging practice in collective bargaining is an initial, albeit very general, attempt to introduce a workers' right to training and reskilling in the sectoral collective agreement also covering also the automotive industry. The idea of OZ KOVO was to establish a sectoral benchmark of guaranteeing a minimum entitlement five days of training per year to each worker. There is no specific time period related to this stipulation, the five days do not refer e.g. to a calendar year or other specific period. Using this benchmark in the sectoral agreement, the union expects that company-level collective agreements would develop more precise measures to implement this entitlement for retraining, or even increase the number of days for training. While the 5-day right for training is not yet exactly anchored in the collective agreement covering the automotive industry, the OZ KOVO union strives to include it as a benchmark, similar to other sectoral agreements that OZ KOVO concluded in the steel industry and in the mining, metallurgy and geology industry.

The sectoral agreement in the steel industry stipulates the possibility of **avoiding redundancies due to the implementation of new digital technologies by retraining or reskilling the employee and reassigning them to another position within the same employer** (see Table 5). This is a new type of stipulation, or emerging practice, prioritized by the OZ KOVO trade union also in the sectoral bargaining relevant for the automotive sector.

Table 5. Stipulations on training and requalification – steel sector

Name of the agreement	Original wording	English translation
<p data-bbox="204 813 521 902">Higher-level collective agreement in the steel sector</p> <p data-bbox="204 954 395 981">Valid: 2021-2023.</p> <p data-bbox="204 1028 521 1120">Note: The same wording was also part of the agreement valid in 2018 – 2020.</p>	<p data-bbox="544 327 924 389">Článok 15. Kvalifikácia, rekvalifikácia</p> <p data-bbox="544 398 924 880">1. Zamestnávateľ sa stará o prehlbovanie kvalifikácie zamestnancov alebo o jej zvyšovanie. 2. Zamestnanec je povinný sústavne si prehlbovať kvalifikáciu na výkon práce dohodnutej v pracovnej zmluve. Prehlbovanie kvalifikácie je aj jej udržiavanie a obnovovanie. Zamestnávateľ je oprávnený uložiť zamestnancovi zúčastniť sa na štúdiu popri zamestnaní a na ďalšom vzdelávaní s cieľom prehĺbiť si kvalifikáciu.</p> <p data-bbox="544 889 924 1178">2. Zamestnávateľ môže so zamestnancom uzatvoriť dohodu, ktorou sa zamestnávateľ zaväzuje umožniť zamestnancovi štúdium popri zamestnaní na zvýšenie kvalifikácie. Náležitosti dohody obsahuje § 155 Zákonníka práce.</p> <p data-bbox="544 1187 924 1603">3. Ak v dôsledku zavádzania nových digitálnych technológií do výrobného procesu dôjde zrušeniu pracovných miest, využije zamestnávateľ v rozsahu svojich potrieb a možností po dohode so zamestnancom formu rekvalifikácie, preškolenia alebo tréningu zamestnanca s cieľom jeho zaradenia na inú pracovnú pozíciu u toho istého zamestnávateľa.</p>	<p data-bbox="946 327 1326 353">Article 15. Qualification, retraining</p> <p data-bbox="946 362 1393 781">1. The employer shall take care of the deepening or qualification of the employees. 2. The employee is obliged to constantly deepen his / her qualification for the performance of work agreed in the employment contract. The deepening of qualifications is also its maintenance and renewal. The employer is entitled to require the employee to participate in studies in addition to employment and further education in order to deepen their qualifications.</p> <p data-bbox="946 790 1393 1048">2. The employer may enter into an agreement with the employee by which the employer undertakes to enable the employee to study in addition to employment to improve his qualifications. The details of the agreement are contained in Section 155 of the Labour Code.</p> <p data-bbox="946 1057 1393 1314">3. If the introduction of new digital technologies into the production process results in job losses, the employer shall, to the extent of his needs and possibilities, use a form of retraining, training the employee in order to transfer him to another job with the same employer.</p>

Source: Higher-level collective agreement in the steel industry.

To further benchmark the bargaining developments in the automotive industry with similar sectors, it is relevant to mention the developments in the **electrotechnical industry**, where OZ KOVO bargains a sectoral agreement with the Employers' Federation of the Electrotechnical Industry (*Zväz elektrotechnického priemyslu, ZEP*). ZEP supports reskilling and training measures, yet while the current agreement includes education-related clauses (see Annex 1), ZEP prefers not to anchor these to (sectoral) collective agreements. The argument behind is the diversity of employers and their internal policies and training capacities, which should leave the training tools at the discretion of individual employers. This is similar to the current approach of employers in the automotive industry.

To sum up, beyond the presented emerging yet scattered practices to address training needs via collective agreements, a systematic approach to addressing structural changes via collective bargaining cannot (yet) be documented. The current stipulations establish a basic benchmark for the right to education/reskilling/training, without further specifying its details or length. This stipulation is not sufficient for proper reskilling but serves as a signal that education/adaptation is relevant and collective bargaining is ready to pay attention to it. OZ KOVO plans to use this stipulation as the basic benchmark and plans to motivate company-level negotiators to stipulate more days for training in particular company-level agreements.

Trade unions push for a fixed benchmark of 5 days per worker for education rights, but employers, represented by the Association of Industry Federations and Transport (APZD), resist a fixed benchmark, preferring direct handling of training and reskilling without multi-employer coordination.

5. Case studies

This section provides insights into the findings from workplace level. To best capture how DAD impacts collective bargaining in various contexts, in our case selection, we have considered the following factors:

Stage of DAD: The first case study is as a manufacturer of end-use vehicles, launching a production of a new e-model in 2025. The selection of this Original Equipment Manufacturer (OEM) company allows us to observe the challenges of planned e-driven restructuring. Automation, digitalization, and decarbonization (greening of the factory) as more gradual processes throughout the production are present too. The second company, operating as a supplier manufactures a product portfolio that does not fall under the effects of decarbonization, however it's a leader in the digitalization of solutions for production optimization and develops activities in established R&D centre.

Complexity of product and its production: DAD-related implications vary based on technical aspects of production and depend on complexity of the product and its production. The greater the complexity, the more difficult it is to automate and digitize the production process (Krzywdzinski, 2021). To maximize the potential for observing demonstrations of D-A-D at workplace, we opted for an OEM plant with multiple products and thus also multiple paths of production, as well as a supplier plant with a single product and much straightforward organization of production.

Geographical location: The automotive sector in Slovakia exhibits significant regional disparities, and the implementation of a just transition strategy seems to exacerbate these differences. The strategy is selective, offering substantial financial support to companies and, consequently, workers in the three of the most decarbonizing regions. Despite confronting similar sector-driven challenges, the supplier case study is situated in a region grappling with an aging population and brain drain, yet it is eligible for financial aid. Conversely, the final producer operates in a region that is somewhat more demographically stable but lacks a development strategy and, consequently, does not receive funding.

Trade union access and representation: Trade unions operating in both OEM and supplier plants belong to the largest metalworking union, OZ KOVO. Given that the Slovak automotive sector does not fully decentralize collective bargaining, it allows us to observe the processes of articulation and coordination within the framework of multilevel collective bargaining. In

both cases, union representatives lead the company collective bargaining process and are active members of the automotive committee of OZ KOVO, which serves as an information exchange platform.

Furthermore, findings from the company case studies will be complemented by insights from an additional 'reference company.' The company is a leading OEM serving as benchmarks for the selected case studies. Data from the reference companies have been collected by the authors of this report during the previous research.

Below, we present the two company case studies (a final producer and a supplier) and a third benchmark case company. Company names as well as representatives are anonymized upon the respondents' request. The structure of the two cases' presentation is as follows: introductory information about the company, state of the art implementation of DAD processes and their implications for the workforce, overview of retraining mechanisms adopted in the case companies, integration in collective bargaining and finally a summarization of key findings from the case studies.

5.1. Case study 1: final producer plant ahead of e-driven restructuring

The first case study involves an OEM plant located in Slovakia that specializes in the production of personal vehicles. This OEM facility serves as a key factory within a multinational corporation (MNC) group in Europe, exporting cars to 83 countries, mostly to the UK, Germany, and Spain.

The current production contains five diesel models, three of which are manufactured in electricized versions (MHEV, HEV and/or PHEV). An important portion of OEM activities consists of in-house engine production: the plant is the only carmaker in Slovakia that produces both petroleum and diesel engine (89% share of petroleum engine production). In the year 2022, the OEM plant achieved the production of 311,000 cars and 462,000 engines. Electrified HEV or PHEV cars accounted for more than 30% of the total production in 2022 (Company's internal document 2023).

The company employs 3,600 employees, with only 12% being women. The average length of employment is 11 years and the company is generally considered a stable employer. Blue-collar workers receive an average gross monthly wage of 2,100 EUR (Company's internal document, 2023). Overall, there is constructive social dialogue between management and the trade union organization OZ KOVO tied in Collective Bargaining Agreement (CBA).

From 2025, the company plans to integrate the production of electric models, which is assumed will boost massive restructuring due to the in-house engine shop. However, as indicated by management, the transition will be gradual, and the manufacturing process of electric vehicles will be integrated into the current production line. The result will be the flexibilization of production flow (Interview SK8).

DAD relevance

Since its establishment, the OEM plant initiated its production at a very high technological level. From 2006 to 2023, the number of robots in the plant increased by 50% to more than 600 (Interview SK8). Digital and automation technologies were gradually implemented in both administrative processes as well throughout the whole production stage. In the latest period, technologies have been put in place in the Assembly (installation of the sunroof in the car), in

the Paint Shop by introducing new robotic workplaces for applying putty to the bodywork. A new digital 3D scanner in the Press shop for measuring the quality of the surface of pressed parts, and collaborative robots were added to the Welding Shop. UiPath software is used to automate some administrative processes (company adds 3-5 processes every year) (SK8). This form of automation (RPA - robotic process automation) replicates the specified steps like a human, makes routine work easier for users and thus creates space for a creative agenda. Employees also use a digitalized HR app for managing employee relations (wages, holiday, requests etc.).

In terms of operational decarbonization, the corporate goal is to only sell electric cars in Europe by 2035 and to achieve carbon neutrality in its entire value chain by 2045, including production. The OEM is purchasing certified green energy and implements solutions to decrease the usage of gas mainly in its paint shop. The management plans to install a photovoltaic power plant somewhere between 2024-2026.

Impact of workers

The production of electrified models has been fully integrated into existing production lines and as a result, work procedures have not changed dramatically. Yet in the future, the company wants to go fully electrical by 2035 which puts into question the operation of the entire engine shop. While no information about planned redundancies has been provided, the company is negotiating a state aid agreement, which is conditioned to the preservation of 3500 jobs. According to the union representatives, employees are likely to be reassigned to other stages of production, particularly assembly, as it involves a similar workflow and that workers are willing to undergo training (Interview SK9).

Fundamental changes have occurred in cases when human work was replaced by the automated technology. Automation mainly affects production workers. In the case of introducing RPA solutions, it also affects employees in administration. In cases of such organizational changes, employees are primarily offered alternative spots. For example, after the installation of new robots in the paint shop, the 54 workers who were replaced by robots found employment in other stages of the production process. At the engine plants, there was a transfer of employees from the engine plant producing diesel engines to gasoline engines, which currently constitute the majority of production.

When reassigning employees to new job positions, there is a change in job classification considered in the employment contract. Reassignment is not linked to any specific additional payment or reward however it can be the subject of a pay increase through variable components.

“...the employee actually receives points, then it directly affects the amount of the variable component of the salary. So yes, the more he knows, the more he has a chance to get a higher variable component.” (Interview SK8)

The company faces a significant shortage of skilled professionals in the labour market, especially in the context of electrification. Working with electric vehicles requires new knowledge, and it is challenging to secure enough external technicians and experts from different countries for the actual installation and use of new technologies. Moreover, the requirements for the qualifications of employees working with new technologies have increased due to higher demands for operation and maintenance. Nevertheless, the company

maintains a competitive advantage over other companies in the region due to comparatively high wage levels.

Regarding medium-skilled workers, the company is in a region that is not fully demographically exploited. Apart from 130 agency employees, recruitment is primarily from people in the region. However, in the past, especially during the Covid-19 pandemic in 2019, the company faced a shortage of workers. As a response, they initiated a cooperation with the labour office and recruited job applicants from all over Slovakia.

Education and training

The company has developed a system of internal trainers, who are specially hired to provide training for newly employed workers and employees rotating in the production. In case of the first group, the training approach is quite standardized and requires a week-long training in a company's training centre. In terms of training rotating or relocated workers who need new technology-related skills, the approach is highly individualized and is often provided by the company that developed the technology. As highlighted by management, due to the dynamics of changes linked to DAD, some workers have to be retrained on a regular basis. This is the case for all workers and technicians dealing with programming and technology maintenance.

Table 6. Training courses in the OEM plant

Training course	Target group	Objective	Form
Orientation Programmes	Newly employed workers and promoted employees	Understanding the structure and way of functioning of the company, as well as smoothly integrating into a new job or position.	In-class
Competence based Programmes	Supervisors and administration workers	Increasing the level of basic, work and management competences and supporting the development of corporate culture.	In-class/online
Technical Programmes	All employees	Ensure real professional training needs and increase the professional knowledge and skills of employees of specific departments for effective management of work tasks.	In-class/online
Language Programmes	All employees	English language courses help employees reach the required level according to the European reference framework. Provided are Slovak language courses for Korean managers and Korean language courses for Slovak employees.	In-class
Computer based Programmes	All employees	Ensure the development of computer skills for specific job positions	In-class/online
Legislation awareness Programmes	All employees	Through regular training and retraining of employees, the company ensures the smooth running of production and the updating of the requirements established by law for the performance of work	In-class
Career/expert growth Programmes	Employees with significant potential	To develop the above-average potential of employees, respectively to support the expert position of the employee in the company.	In-class

Source: the authors based on company internal documents

The company is also involved in a dual system of VET in cooperation with five schools in the region focusing on electrotechnical and mechanical engineering, IT and administrative subjects. Since 2012, the company has offered apprenticeships to 186 students (86 of these students were in apprenticeship in the single year of 2022). However, only a small portion of them transitioned into full-time employment after graduation. Most of the students have continued with general university studies.

In order to empower highly skilled automotive professionals, the company has initiated study programs and pilot projects in collaboration with three technical universities. One such pilot project involves 20 final-year students from a nearby technical university, aligning their 'combustion engine testing' subject with the operations at Kia's engine manufacturing facility. The OEM management has implemented a financial aid program, sponsoring pre-selected employees to engage in an extended Vocational Education and Training (VET) program and enhance their technical qualifications. Currently, 15 students (5 from each university) are enrolled in the grant program, each receiving a scholarship.

The role of social dialogue

Social dialogue is facilitated through daily ad hoc meetings, where unions and management address immediate issues. A regular meeting with the entire local union OZ KOVO Kia Žilina is organized once a month discussing health and safety, work organization, benefits provided, legislative changes and proposals as well as the introduction of new technologies and planned investments. Usually, once or twice a year, management meets the leaders of sectoral metal union OZ KOVO to discuss sectoral development and contextual topics.

Only one trade union operates in the plant and engages in collective bargaining with the company representatives. There are around 650 union members, which account for 19% of the company's employees who are mostly blue-collar workers (Interview SK9). The collective agreement signed for the period 2020-2026 predominantly addresses matters such as wage increases, supplements, support mechanisms for health issues, pension and family policy. Usually, the process of CBA negotiation used to take more than six months, however there have been both-sided efforts to shorten the procedure to maximum 6 weeks.

A trade unions right to co-determination, consultation and information is rooted in the current collective agreement. However, the clauses guarantee receipt of basic in-time information (about employment, production etc.) and thus still fall short of achieving proper codetermination in strategic decisions. This has been evident in the case of e-driven restructuring, when management was sharing only partial information about the future plans with the representative organization (Interview SK9).

Mass-dismissals and right to re-skilling were subject of the latest collective bargaining, however the latter was not included in the final agreement.³ Re/upskilling is a cross-cutting issue between unions and management. The unions tried to seal the company's commitment to re-skilling and proposed a re-skilling voucher of EUR 400 for each employee. The contribution was intended to be used for any course or education that improved employment

³ Due to the expected decrease in employment, unions tried to emphasize redundancy in the form of increased severance pay due to redundancy (3 months beyond the scope of the labour code).

on the labour market. Management did not find this proposition relevant as the company has invested in a broad in-house re-training structure.

“In the context of transition, our costs have risen so much due to re/upskilling. We prefer to use the training structures that are already established and working well. We provide the opportunity and can arrange many of those trainings internally, or through external lecturers.” (Interview SK8)

While union and management were open to further collaboration, current CBA thus only deals with procedural aspects of education/training that derives from labour legislation.

5.2. Case study 2: supplier pioneering digitalization

The second case study explores one of the largest Tier 1 suppliers in the Slovak automotive sector, a foreign-owned company and a crucial part of a German multinational corporation (MNC). In 2022, the MNC went through organizational restructuring through a merger with a fellow MNC. The company operates three production plants, all specializing in the manufacturing of lightweight components for vehicles, showcasing a high degree of technological interconnectivity (similar organization of production, technologies used etc.). Its export portfolio includes collaborations with renowned car producers, mainly with VW (Audi, Porsche, Volkswagen, and Lamborghini), Tesla, BMW, Daimler/Mercedes, and Jaguar Land Rover.

Collective agreements are negotiated for all three production plants. In our analysis, we adopt a complementary approach, with a specific focus on one plant due to its recent establishment of R&D facilities.

In 2021, the company established a pivotal R&D centre within one of its production plants. This centre holds strategic importance as it is the only R&D centre for production of a relevant segment for the whole MNC group. The centre is equipped with a testing room, facilitating final validations before products are introduced to the market. The target workforce for the centre is approximately 100 employees, with the current recruitment rate reaching 70%. To meet staffing needs, the company has initiated the recruitment of professionals specializing in optics, electronics, simulation engineering, and mechanical design—professions that are in relatively short supply in the Slovak labour market.

The company, in total, employs up to 3300 workers. The gender distribution is nearly equal, with 55% male and 45% female employees. The majority of the workforce (over 60%) falls between 31-50 years of age. Notably, there is a growing trend in young employment, constituting almost 20% of employees aged 18-30.

Table 7. Structure of the workforce based on education

Elementary education	98	3%
Secondary education without Maurita	1184	36%
Secondary education with Maurita	1391	42%
University education- undergraduate	64	2%
University education- postgraduate	556	17%
Total	3293	100%

Source: The authors, based on company’s internal document (2023)

DAD demonstration

Implementation of technology is driven by market pressures and product upgrading. As one respondent (SK10) pointed out, *"What was developed and designed for luxury cars in the past using technology can now be produced for less luxurious cars as well. This represents a significant potential for corporate production."*

The company actively embraces a "manless" approach, channelling investments into digitalization to minimize or eliminate operator intervention in pre-production activities. The goal is to progress towards a "touchless" approach, ensuring human contact with the product only occurs during its final packaging. Recognizing the importance of real-time downtime management, the company initiated a project that won the Slovak Automotive Industry Association's main award for the best digitization solution, enhancing production capacity utilization.

Decarbonization influences the company's production processes only indirectly through pressure on greener production process. The company also participates in electromobility, however only as a supplier of lighting components for electric vehicles. In this sense, the shift to electromobility poses a challenge through business relations with the main customers as production capacities allocated for electric vehicles are rapidly growing, and currently account for 30% of the total production in two manufacturing plants. Based on insights from a technical worker (SK10), the company is quite affected by the automakers from Germany (that are their main customers) who are currently in an adverse situation due to the competitiveness pressure with Chinese production.

R&D centre

The establishment of the development centre increased the demand for specified professions such as experienced designers with expertise in manufacturing plastic parts, optical engineers, electronic and simulation engineers, project managers, quality assurance professionals, draftsmen, and various other roles.

The need for electronic designers specializing in optics and plastics was particularly highlighted. The interviewee suggests that, due to the challenges in finding suitable designers in the abovementioned fields, either fresh graduates or those with relevant experience, are often employed and upskilled (SK10). The students circulate within the field, shape their skills, preparing them for the work load, supplemented by ongoing education opportunities within the workplace.

The operation of the centre is slowed down by the lack of skilled workers. *"Integrating new colleagues seamlessly from one place to another proves challenging. Nonetheless, the centre operates continuously, is evolving, strives for stabilization, faces challenges, and genuinely grapples with a shortage of skilled capacities. In reality, particularly in developmental operations, there is a scarcity of candidates in the market due to low unemployment. In this case, the employer truly faces a shortage of highly qualified employees, specifically within the development centre. The centre is gradually building its workforce, navigating through competition, and attempting to outperform rivals."* (SK10)

The region, where the R&D centre is located is fully utilised. Suitable workforce is often hired from other regions, mainly border regions in Czech Republic or Eastern Slovakia. However,

even recruiting from distant regions seems challenging due to high competition between companies.

The role of social dialogue in addressing DAD

The company went through various legal and production reorganizations in 2021, relocating activities from the fourth production plant to three sites within the same region. This resulted in a reduction of 250 workers. Currently, OZ KOVO is in the process of negotiating a collective agreement for all three plants collectively. Over the years, the leading trade union has established a presence in two production plants, covering approximately 58-62% of employees, encompassing both blue- and white-collar workers. In the third plant, where the level of unionization is lower than in the previous two plants, the initial mobilization of workers led to conflicts between company management and the establishment of a "shadow" organization, aligning social dialogue in the supplier company with periods of social unrest that impact the collective bargaining process.

According to a trade unionist, the latest Collective Bargaining Agreement (CBA), effective from 2019-2022, was negotiated during a period of high uncertainty and, as a result, did not provide room for "new topics and innovations." Currently, representatives of union and management are negotiating the wage supplement of the collective agreement. *"Last year, we negotiated a collective agreement where we combined two different collective agreements, two previous systems. It was not an easy task, leaving limited room for introducing new elements, even though we might have liked to. However, a way had to be found to merge the two different worlds into one collective contract."* (SK10)

Requalification was not discussed in the last round of collective negotiations or in informal communication with management. Although there are labor-related challenges linked to DAD in the workplace, the dominant focus remains on bread-and-butter topics such as benefits and wage increases. This trend is expected to persist in future rounds of collective bargaining, with trade unions prioritizing employee participation based on a preference survey conducted among union members.

In general, workers are not heavily invested in prioritizing requalification because they do not feel the immediate effects of technology. *"Change occurs in a gradual, evolutionary way, in connection with the introduction of new technologies. The change is gradual, minimizing its impact on employees. Therefore, many employees do not feel an acute need to address this."* (SK10) The lack of emphasis on requalification in the Collective Bargaining Agreement is perceived as a missed opportunity: *"It's a lost opportunity. The employer will have free hands when it comes to changes in the employment structure, neglecting the social impacts on individual groups of employees."* (SK10)

Regarding requalification regulation, unionists rely on the clauses of the higher-level collective agreement. The company is subject to a higher-level collective agreement in the electrotechnical sector, which, compared to other higher-level collective agreements, provides innovative conditions. It establishes wage-binding conditions for requalification in the event of the introduction of technological changes and roots obligation for negotiations with the trade union at least once a calendar year on all measures related to deepening and increasing qualifications (See Annex 1). Article 10 of the agreement stipulates that *"the employee has the right to education, i.e., training or retraining, for a minimum of 5 working days with wage compensation."*

5.3. Case study 3 – benchmark case

One of the largest automotive producers in Slovakia stands out as an exemplary model of company-level education and training of workers. Operating in Slovakia since 1991, the German automotive giant has established itself as a leader in internal training. With over 11,000 employees in Slovakia the company prioritizes skill development through a comprehensive internal education system instead of relying to publicly funded education schemes for individual workers (Interview SK15)

The company utilizes a competence management system to identify skill gaps, collaborating with other professional stakeholders and employer associations. This system not only aids in workforce training but also contributes insights to broader sectoral and national vocational education strategies. Regular skills assessments inform continuous internal training provided by the company.

Employees undergo training when new technologies are introduced or production processes change. Additionally, the company is in partnership with external vocational education institutions like the Dual Academy (*Duálna akadémia*) and helps implementing learning modules for highly skilled professions that are in high demand in the automotive industry. Workers are encouraged to attend training during work hours, a practice that contrasts with smaller companies where self-education in spare time often lacks motivation without supportive explanation of its benefits e.g. by the public employment service, the employer or a trade union.

The company emphasizes employee involvement in selecting courses, allowing them to decide which skills to develop. They offer various educational activities both through internal and external trainers. Moreover, the company engages in regulated employment of third-country nationals in partnership with ÚPSVaR, particularly for highly skilled roles or during specialized project phases.

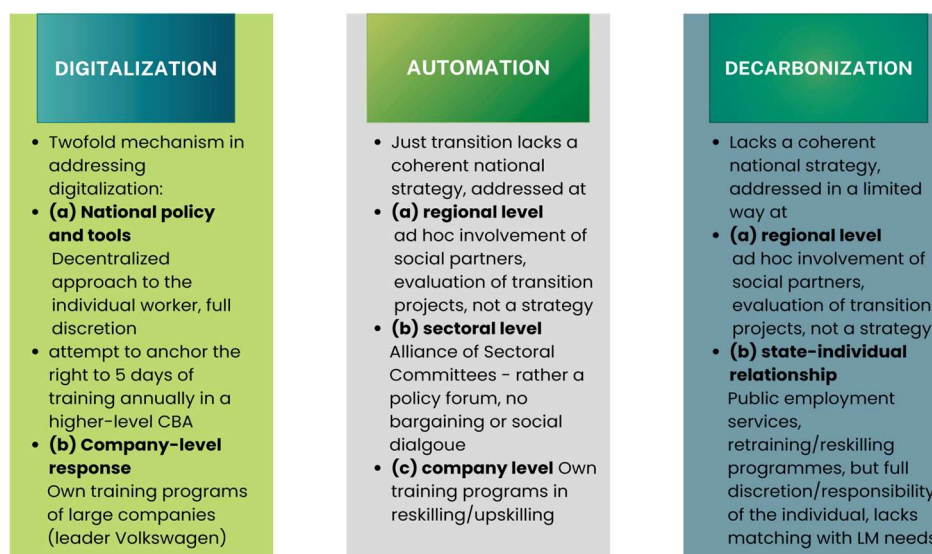
With such a developed internal education system, the company thus serves as a benchmark for the authors' assessment of addressing the challenges of DAD and responses via collective bargaining in the other two case companies. Despite a well-developed internal education system that in a way responds to the lack of national education/reskilling strategies and pushes large companies to develop their own internal reskilling systems, these measures are currently not subject to collective bargaining with trade unions. The company prefers to maintain discretion over its training/reskilling tools and measures without an extensive trade union involvement in regulating these efforts.

6. Findings and conclusions

This report scrutinized the impact of DAD on policy discourses in Slovakia and on creating opportunities for collective bargaining. At the same time, the report aims at considering how bargaining helps addressing the goals and challenges derived from DAD. The analysis was anchored in a multi-level governance perspective streamlining responses at the national, sectoral, regional and company levels (see Figure 4).

Figure 4. DAD and collective bargaining in Slovakia

(The Limited) Role of CB in addressing DAD



Source: the authors.

Slovakia is a small open economy with a strong industrial orientation of its economy. The metal sector, also including the automotive subsector, belong to key production and export sectors. At the same time, this sector has been extensively exposed to DAD processes, especially digitalization and automatization, while decarbonization has been thematized mostly in the context of regions whose economic structures are transforming from coal-mining to other types of economic activity. Acknowledging the diverse effects of digitalization, automatization and decarbonization, the level of response has also differed (see Figure 4). In digitalization, policy responses emerged predominantly at the national and company levels. In automatization, the regional, sectoral and company levels saw various types of emerging responses yet lacking horizontal or vertical coordination. Finally, responses to decarbonization are addressed in a limited way at the national and sector levels, focusing predominantly on selected regions affected by decarbonization targets.

Within the presented initiatives, a systematic approach to address structural changes through collective bargaining have not yet emerged. Social partners are involved among other stakeholders in national policy discourses, but their involvement is not based on any privileged position in shaping DAD responses e.g. via education reforms, reskilling and training tools. Their involvement is rather ad hoc and based on the position of power of a particular union or employers' association to access the policy discourse. The role of collective bargaining is substituted by the concentration of efforts of employers (and to some extent also trade unions) to address the impact of structural changes via sectoral and national-level policy making. One of the key new national platforms bringing together a variety of stakeholders is the establishment of alternative forums for sectoral stakeholder dialogue. These forums engage in formulating policy recommendations, diverting attention from bargaining priorities towards policymaking. Comprising various stakeholders, including the government and social partners, these forums do not facilitate the conclusion of collective

agreements. Instead, they serve as newly introduced structures for expert discussions aimed at influencing policymaking.

While trade unions strive to be active in national and regional policy discourses, they also push for including more DAD-related stipulations, especially in training and reskilling, into collective bargaining. In the metal/automotive sector, the sectoral agreement does not yet provide specific stipulations regarding the technological change, but in similar sectoral agreements in industry, social partners have managed to establish a fundamental standard for education, reskilling, or training rights without specific details or duration. While this isn't adequate for comprehensive reskilling, it signifies the relevance of education and adaptation, showing that collective bargaining is attentive to this aspect. OZ KOVO intends to utilize this provision as a starting point also in the metal sector's collective bargaining, encouraging negotiators at the company level to secure more training days in specific agreements.

In particular, trade unions advocate for a fixed standard of 5 days per worker for education rights, whereas employers, represented by the Association of Industry Federations and Transport (APZD), oppose a fixed benchmark. They prefer managing training and reskilling directly without coordination among multiple employers. The current state of addressing DAD challenges is thus heavily employer-driven and the presented case studies demonstrate the approach that employers have taken at the company level.

Based on observations from two case studies (one final producer and one supplier company) the following general findings can be formulated. First, there is a **mismatch in skills** gained in educational programmes compared to the demand of employers. While this has been a persistent long-term challenge, the implementation of Industry 4.0, decarbonization and electrification, amplifies the significance of this issue. Second, companies (mainly the final producers) invest in **in-house company training** centres and develop their own initiatives and **personalized programmes with secondary schools (VET) and universities**. Third, because of investments into training, **employers prefer full discretion over re-skilling** and are reluctant to include training-related clauses in collective agreements. Fourth, trade unions play only a limited role in the company-level response strategies to DAD. They are aware of the importance of re/upskilling of workers in the context of D-A-D, however it is not among bargaining priorities as **re-skilling themes mean a trade-off with wage-related supplements** in CBAs. Fifth, **labour and skill shortages mitigate displacement effect of technologies** (workers are rarely made redundant, rather offered alternative job within the workplace). Finally, **skill shortages create opportunities for reskilling and upskilling**, and open eligibility criteria for workers that can participate (even workers with different expertise or lacking specific expertise can participate).

In these conditions, the role of the state will remain a crucial determinant in shaping the future trajectories in collective bargaining adopting stipulations in response to DAD challenges. The September 2023 elections demonstrated a significant political turn in Slovakia, yet industrial production is extremely important for the Slovak economy regardless of political leadership. The social partners are aware of this fact, and the coming year(s) will show whether they will remain committed to their strategies requesting an adjustment in workers' skills by direct political lobbying and national-level policy discourse involvement or will attempt to strengthen independent bargaining structures that are based on promising foundations in the metal sector.

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Annex 1

Stipulations on training and requalification – electrotechnical sector

Name of the agreement		English translation
<p data-bbox="204 1032 523 1133">Higher-level collective agreement in the electrotechnical sector</p> <p data-bbox="204 1189 523 1290">Negotiated between OZ KOVO Electrotechnical industry association of SR</p> <p data-bbox="204 1339 416 1368">Valid: 2022-2026.</p>	<p data-bbox="544 412 959 479"><u>Článok 10. Vzdelávanie zamestnancov</u></p> <p data-bbox="544 490 959 1016">1. Zamestnávateľa sa budú starať o prehĺbovanie alebo zvyšovanie kvalifikácie zamestnancov tak, aby sa dosiahla čo najširšia zhoda medzi cieľmi podnikania a s nimi súvisiacim realizovaným vzdelávaním a so vzdelávacími a kvalifikačnými záujmami zamestnancov. Zamestnávateľ zabezpečí pre zamestnancov rekvalifikáciu najmä vtedy, ak jej realizáciou možno predísť skončeniu pracovného pomeru u zamestnávateľa a zamestnancovi ponúknuť inú vhodnú prácu.</p> <p data-bbox="544 1032 959 1240">2. Zamestnávateľa budú podporovať také formy vzdelávania, ktoré zabezpečia zlepšenie kvalifikačnej a vedomostnej úrovne zamestnancov.</p> <p data-bbox="544 1256 959 1890">3. Ak v súvislosti so zavádzaním technologickej zmeny do výrobného procesu bude ohrozené pracovné miesto zamestnanca; zaškolenie a zaučenie na novú technológiu je možné z hľadiska legislatívy; je to v záujme zamestnávateľa, a ak obe strany o rekvalifikáciu prejavia záujem, má zamestnanec právo na vzdelávanie, t.j. tréning alebo rekvalifikáciu v rozsahu najmenej 5 pracovných dní s náhradou mzdy. Účelom rekvalifikácie je znížiť vplyv novej technológie na rušenie pracovných miest zamestnávateľa.</p> <p data-bbox="544 1906 959 2033">4. Zamestnávateľ sa zaväzuje najmenej jedenkrát v kalendárnom roku prerokovať s odborovou organizáciou všetky</p>	<p data-bbox="981 412 1396 479">Article 10. Education of employees</p> <p data-bbox="981 490 1396 1055">1. Employers shall take care of deepening or increasing the qualifications of employees so as to achieve the most possible match between business goals and the related education implemented and with the educational and qualification interests of employees. The employer will ensure retraining for employees, especially if its implementation can prevent termination of the employment relationship with the employer and offer the employee another suitable job.</p> <p data-bbox="981 1066 1396 1240">2. Employers will support forms of education that ensure the improvement of the qualification and knowledge level of employees.</p> <p data-bbox="981 1252 1396 1890">3. If in connection with the introduction of a technological change into the production process, the employee's job will be threatened; training and learning new technology is possible in terms of legislation; it is in the interest of the employer, and if both parties express an interest in retraining, the employee has the right to education, i.e. training or retraining in the scope of at least 5 working days with wage compensation. The purpose of retraining is to reduce the impact of new technology on the disruption of the employer's jobs.</p> <p data-bbox="981 1901 1396 2033">4. The employer undertakes to negotiate with the trade union at least once in a calendar year all measures related to deepening</p>

	<p>opatrenia súvisiace s prehĺbovaním a zvyšovaním kvalifikácie.</p>	<p>and increasing qualifications Conditions and rules for employee training are agreed in company-level agreement, respectively in another internal document.</p>
	<p><u>Článok 11. Dodatočné motivačné štipendium</u></p> <p>V PKZ resp. v osobitnej dohode so zamestnancami možno dohodnúť, že zamestnávateľ poskytne mesačne v období školského vyučovania žiakovi, ktorý sa pripravuje na povolanie, skupinu povolání alebo odborných činností v študijnom odbore alebo v učebnom odbore zaradenom do zoznamu študijných odborov a učebných odborov s nedostatočným počtom absolventov pre potreby trhu práce, nad rámec § 27 ods. 3 zákona o odbornom vzdelávaní ďalšie motivačné štipendium, a to najmenej vo výške</p> <p>a) 30 % sumy životného minima podľa osobitného predpisu pri priemernom prospechu žiaka do 1,8 vrátane,</p> <p>b) 20 % sumy životného minima pri priemernom prospechu žiaka horšom ako 1,8 do 2,4 vrátane alebo</p> <p>c) 10 % sumy životného minima pri priemernom prospechu žiaka horšom ako 2,4 do 3,0 vrátane.</p>	<p>Article 11. Additional incentive scholarship</p> <p>In company collective agreement or in a special agreement with the employees, it can be agreed that the employer will provide an additional incentive scholarship to student who is preparing for a profession with insufficient number of graduates on the labour market, beyond § 27 par. 3 of the Act on Vocational Education additional incentive scholarship, at least in amount</p> <p>a) 30% of the amount of the subsistence minimum according to a special regulation, with an average grade of up to 1.8 inclusive,</p> <p>b) 20% of the amount of the subsistence minimum if the student's average grade is worse than 1.8 to 2.4 inclusive, or</p> <p>c) 10% of the amount of the subsistence minimum if the student's average grade is worse than 2.4 to 3.0 inclusive.</p>
	<p><u>Článok 12. Podnikové štipendium</u></p> <p>1. V PKZ resp. v osobitnej dohode so zamestnancami možno dohodnúť, že zamestnávateľ, ktorý uplatňuje systém duálneho vzdelávania v zmysle osobitného predpisu, prijme vnútro podnikový predpis upravujúci pravidlá pre poskytovanie podnikového štipendia.</p> <p>2. Zamestnávateľ prijme pravidlá pre poskytovanie podnikového</p>	<p>Article 12. Company scholarship</p> <p>1. In company collective agreement or in a special agreement with the employees, it can be agreed that the employer, which applies the system of dual education in the sense of a special regulation, will adopt an internal regulation regulating the rules for the provision of a company scholarship.</p>

	<p>štipendia tak, aby každému žiakovi zapojenému do systému duálneho vzdelávania mesačne v období školského vyučovania vznikol nárok na poskytnutie podnikového štipendia najmenej vo výške sumy životného minima určeného pre zaopatrené neplnoleté dieťa alebo nezaopatrené dieťa podľa osobitného predpisu. Pri určovaní výšky podnikového štipendia až do výšky štvornásobku sumy životného minima určeného pre zaopatrené neplnoleté dieťa alebo nezaopatrené dieťa podľa osobitného predpisu sa prihliada najmä na dosiahnutý prospech žiaka na praktickom vyučovaní a jeho pravidelnú účasť na praktickom vyučovaní.</p>	<p>2. The employer shall adopt the rules for the provision of a company scholarship so that every pupil involved in the dual education system is entitled to a company scholarship at least in the amount of the subsistence minimum determined for a dependent minor child or a dependent child according to a special regulation. When determining the amount of the company stipend, up to four times the amount of the subsistence minimum determined for a dependent minor child or a dependent child according to a special regulation, the pupil's achievement in practical classes and his regular participation in practical classes are taken into account.</p>
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Source: Higher level agreement in electrotechnical sector

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