Bargaining upfront in the digital age

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TRADE UNIONS IN THE DIGITAL AGE: COUNTRY FICHE ON GERMAN MANUFACTURING SECTOR

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INDEX

1.
GOVERNMENTAL POLICIES FOR THE DIGITALISATION OF THE ECONOMY

There is a number of ongoing strategies at national level to promote digitalisation:

Shaping digitalisation. It is a federal government's implementation strategy for shaping digital change and was established in 2018. It includes over 100 measures in five dimensions:

1. *Digital competence:* equipping people with the skills and competencies necessary to deal with digitalisation by providing programmes in the educational system and the working and business world.
2. *Infrastructure and equipment*: building up digital networks connecting people in cities and rural areas at any times while keeping this infrastructure secure.
3. *Innovation and digital transformation*: ensuring long-term prosperity and protection of the social fabric on national and international level by turning technological research into technological products.
4. *Societal shift toward digitalisation*: establishment of framework conditions that support positive and solidary progress within all groups of society.
5. *Modern government*: establishment of simple, accessible and secure interaction with the administration.

For further information, please check here.

Artificial Intelligence strategy. It was initiated by the federal government in 2018 and receives funding of 5 billion Euro until 2025. The enormous strategy consists of around 100 development plans, initiatives, cooperation, etc. in 12 dimensions:

1. *Strengthen research in Germany and Europe to become a driver of innovation*: The government provides an annual amount of 50 mln Euro to support five competence centres on artificial intelligence all over Germany. In addition to that, the German Research Center for Artificial Intelligence is promoted. Fundamental research as well as research for different areas of application are supported (autonomous driving, IT-security, microelectronics etc.). Artificial intelligence is also seen as a possible driver for ecological and resource efficient manufacturing and agriculture.
2. *Innovation competitions and European innovation clusters*: The

government wants to provide space for disruptive and innovative ideas, solutions, applications, or business models. As an example, since 2019, 11 German universities compete over the development of an energy efficient microchip that can recognize cardiac arrhythmia.

3. *Transfer to the economy, strengthen mid-sized companies:* Companies of all sizes, start-ups, small and middle size companies and major corporations, are supposed to be enabled to develop and use AI-applications.
4. *Support of start-ups*: The government wants to support AI-based business models in the capital-intensive phase of foundation by creating stronger incentives for investors and supporting an increasing number of spin-offs from research.
5. *Usage of AI in the working world and the labour market*: The government want to accompany the increasing change of the working world due to AI-technologies with a national strategy of further qualification. The implementation of such technologies will be monitored, analysed, supported and evaluated within single companies but also on a national and international level.
6. *Support of education and acquisition of experts and skilled workforce*: New methods and contents for all levels of education are needed to promote a widespread understanding of AI, especially among young people. Universities will be supported in order to attract professionals, establish new chairs and create appropriate surroundings for research and teaching.
7. *Usage of AI in administration*: The government wants to use AI in administration in order to offer citizens faster, better and more efficient services.
8. *Make data available and easy to use*: The government wants to increase the amount of utilisable and qualitative data in order to establish Germany as one of the leading AI locations without sacrificing personal rights, the right to informational self-determination or other basic rights.
9. *Adjustment of legal framework for AI-based applications, services and products*: The government wants to re-evaluate and possible also adjust the legal framework for AI- and algorithm-based decisions, services and products to provide an effective protection against discrimination, manipulation, distortion, or any kind of misuse.
10. *Building up standards on German, European and international level*: The government will promote not only technical but also ethical viewpoints in order to establish standards and norms on national, European and international level.
11. *National and international, bilateral and multilateral cooperation*: The government wants to expand international cooperation as well as bilateral and multilateral collaboration in the context of AI since as a cross-cutting issue it affects all areas of science,

economy, administration, and every-day life of citizens.

12. *Societal dialogue and further development of the political framework*: Risks and chances of AI will be discussed with different actors and be made transparent in order to reach an enlightened and informed society. This is preconditioned by transparency, intensive social dialogue, participation and co-determination of all actors affected.

Its goal is to make Germany one of the leading countries in the field of artificial intelligence. For further information, please check here.

Digital future: Learning. Research. Knowledge. It was initiated by the Federal Ministry of Education and Research (BMBF) in 2019. It adopts a holistic approach to digitalisation, tackling five areas in different central sectors of society (medicine, science, economy):

- Living and working better and more sustainable
- Digital education and support of educational institutions
- Knowledge and innovation
- Technological sovereignty and scientific leadership
- Trust and security

For further information, please check here.

STEM action plan (2019). It was initiated by the Federal Ministry of Education and Research (BMBF). For the plan, 55 million euro are allocated until 2022. Its goal is to promote interest in STEM topics (science, technology, engineering, and mathematics) throughout the educational system, and to increase numbers of skilled workforce. A special focus is dedicated to the support of girls and women. For further information, please check here.

Natural. Digital. Sustainable (2020). It was initiated by the Federal Ministry of Education and Research (BMBF). It promotes a connection of education, research and innovation to support sustainability and resource efficiency with digital technologies and innovations. Its main fields of action are:

- Create basis for digital sustainability
- Sustainable design of digital technologies
- Reach goals of sustainability thanks to digitalisation

For further information, please check here.

Main achievements get by the plans and the gaps to be overcome

An important characteristic of all the programmes is that they are using a holistic perspective, combing different actors and their interests and expectations. When matters of labour are affected, they include all social partners and often involve them in the dialogue from very early on. However, since the projects are all still running, it is not possible to analyse their results or gaps at the moment. However, from the amount of funding and the number of

programmes, it can already be concluded that issues within the field of digitalisation are at the top of the Federal Government's agenda and will continue to occupy politics, research, economy, administration and every-day life.

Also thanks to this attention to digitalisation, **Germany in general has a DESI score of 56.1 in 2020** (2019: 51.2; 2018: 47.9) **which translates to rank 12 on EU level.** The processes of research, trial, implementation, re-modelling all take place simultaneously and therefore influence each other reciprocally.

Figure 1. DESI ranking of Germany 2020

Sources: European Commission. Statista, Federal Ministry for Economic Affairs and Energy

2.
GENERAL INDICATORS FOR THE MANUFACTURING SECTOR

Export indicators. In general, Germany is the third largest exporter in the world (behind China and the USA) and also the third largest importer (behind the USA and China). Due to the close integration into world economy, especially the German manufacturing sector relies heavily on open markets and international trading: 56% of all workplaces directly or indirectly depend on export (overall, this is true for 28%). In 2019, the manufacturing sector exported goods and services with a value of 769,333 mln €. The most important trading region for Germany is Europe to which 68.2% of all exports from 2019 went and from which 67.8% of all imports came. The four most important commodity groups were vehicles and vehicle parts (16.8%), machines (14.7%), chemical products (8.9%) and electrical and data processing goods (8.9%) (Federal Statistical Office (Destatis): Fachserie 7, Reihe 1, Zusammenfassende Übersichten für den Außenhandel; Federal Ministry for Economic Affairs and Energy, 2020).

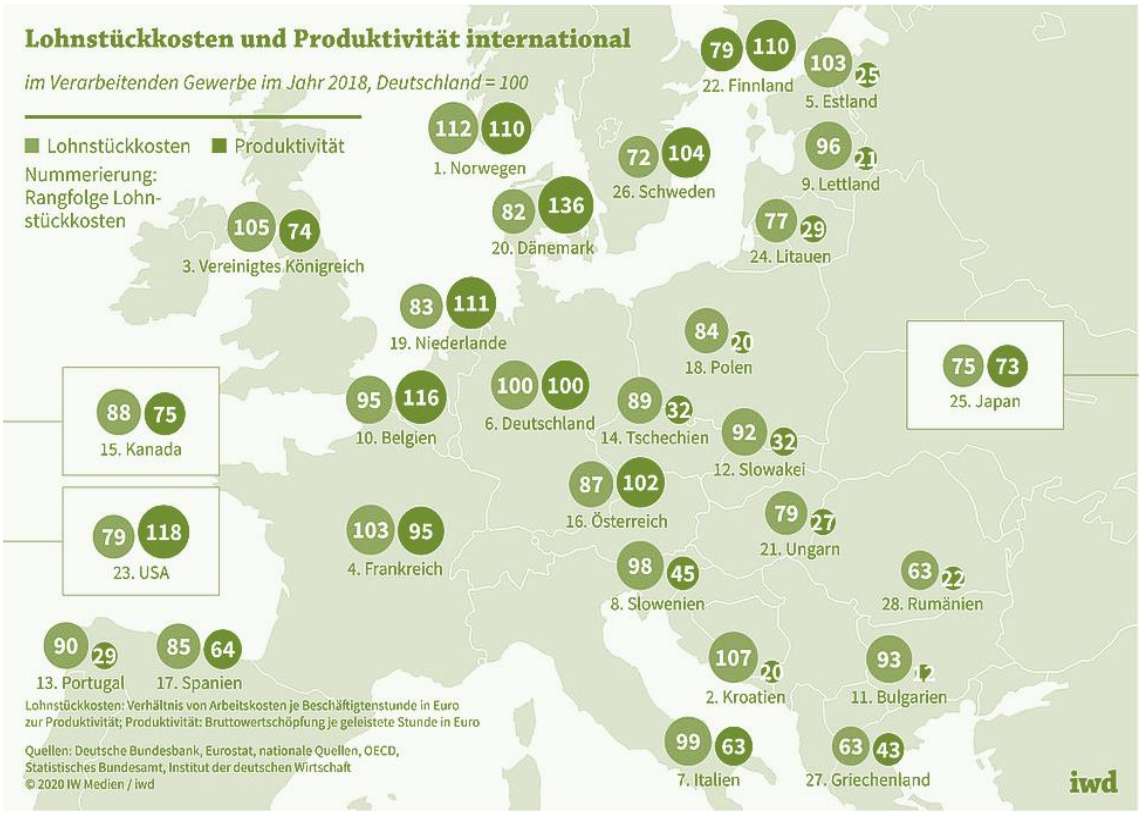
Level of competitiveness. Unit labour costs have been rising for around 6% in 2019 compared to 2018. According to the IMD World Competitive Center (WCC), Germany is on rank 17 when it comes to overall competitiveness among all national economies worldwide in 2019. In 2014, Germany was on rank 6 – the tax system is considered to be the main reason for the decrease.

According to the German Economic Institute, the German manufacturing sector is on rank 6 (2018) when it comes to unit labour costs and productivity in a comparison of 28 important industrialised countries (Figure 2).

In 2020, unit labour costs per hour increased by 2.4% compared to the last quarter of 2019, being the highest increase of the labour cost index in about eight years. This development continued in the second quarter of 2020. At the first peak of the Covid-19 pandemic in March/April 2020, unit labour costs per hour were 4.3% higher than before the pandemic.

However, an analysis of the development of unit labour costs in the EU from 2000 to 2019 by the Federal Statistical Office (Destatis) has shown that Germany was able to improve its relative competitiveness against all EU member states, except the United Kingdom (Destatis 2020).

Figure 2. Labour unit costs (blue) and productivity (black) international in the manufacturing industry (2018)

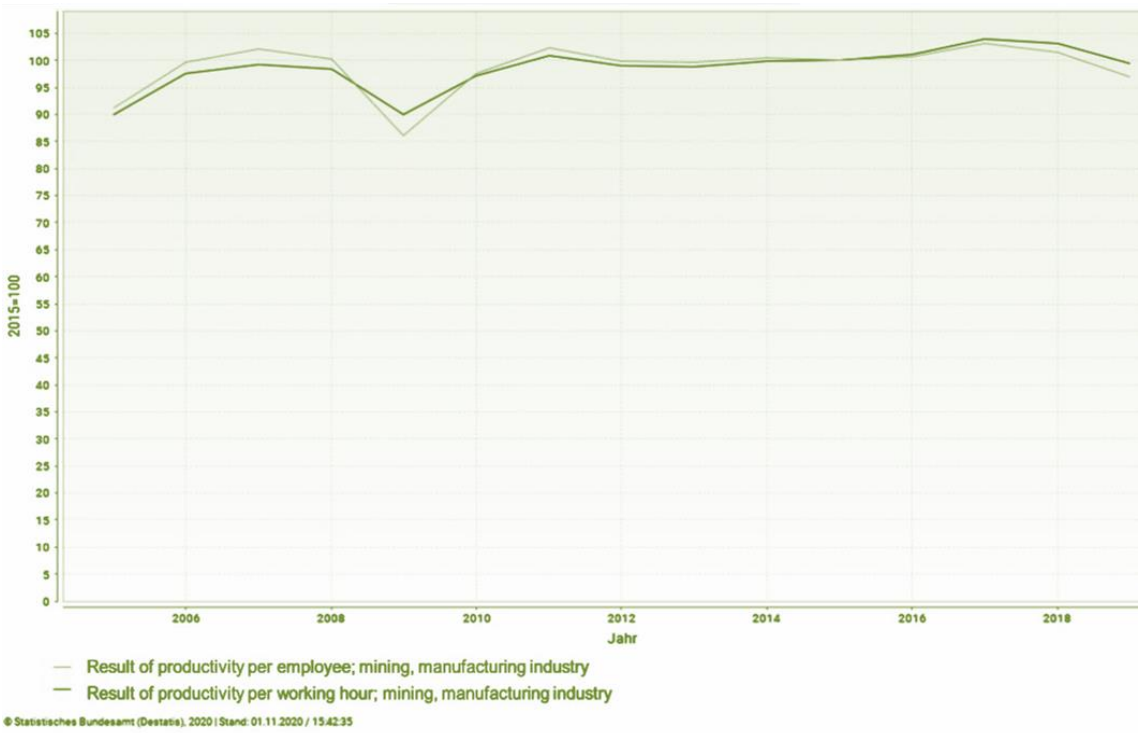


Source: Federal Statistical Office (Destatis), WISTA (5) 2020. Online access. German Economic Institute. Online access. Frankfurter Allgemeine Zeitung. Online access

In 2019, labour productivity per employee was at 96.9 in the manufacturing sector. Labour productivity per working hour was at 99.4, also only considering the manufacturing sector.

Figure 3 shows the development of the index of labour productivity in the manufacturing sector from 2005 until 2019.

Figure 3. Index of labour productivity in the manufacturing industry in Germany (2015 = 100)

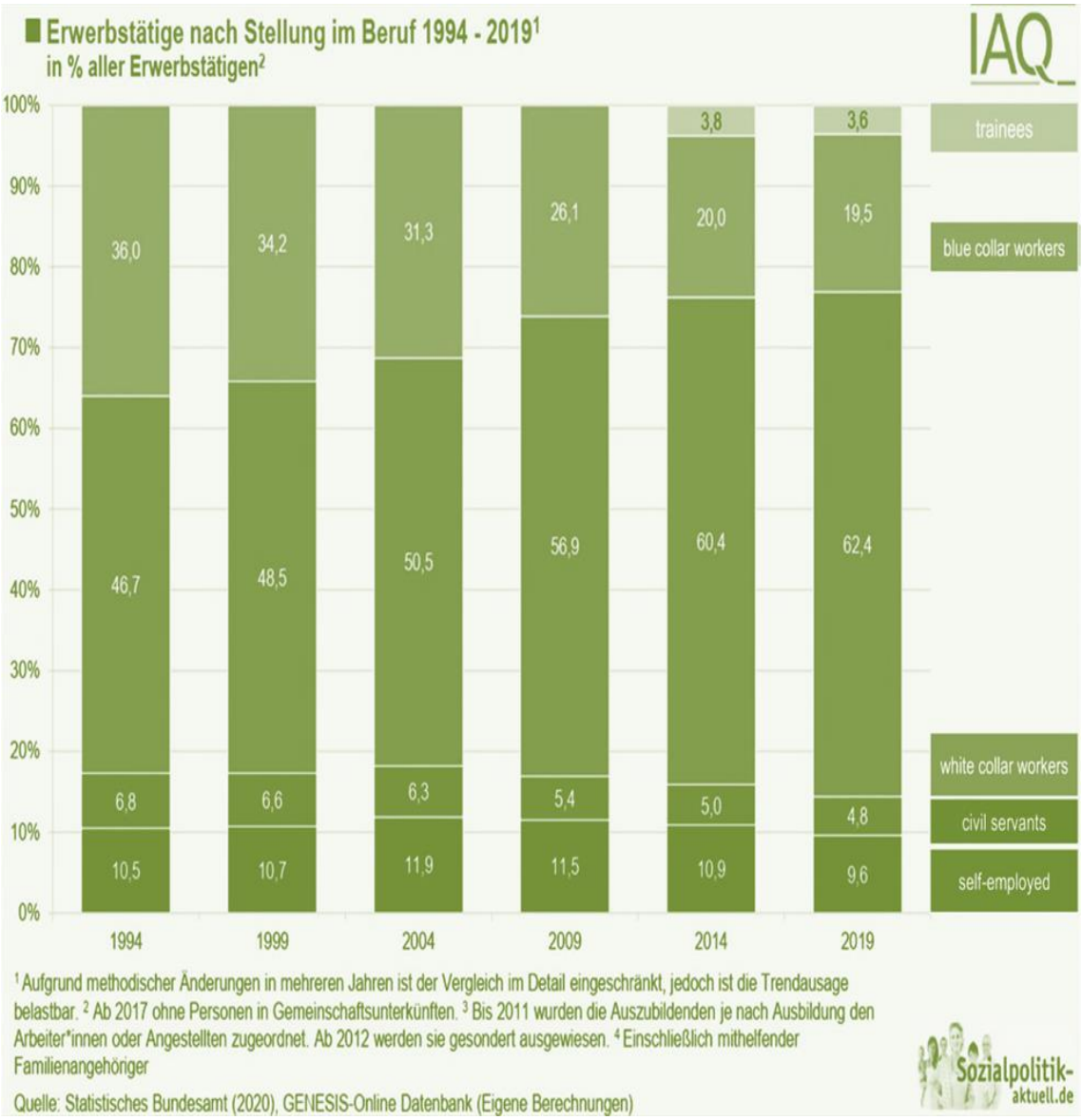


Source: Federal Statistical Office (Destatis), 2020

Level of employment and employee profile. In 2018, around 7.4 million employees worked in the German manufacturing sector. Around 19% of the expenses of the sector account for personnel; around 42% on materials. In 2019, 19.5% of the employees were blue-collar workers (Geman term: *Arbeiter/innen*), whereas 62.4% can be classified as white-collar workers (German term: *Angestellte*).

Figure 4 shows the proportion of the different employment levels from 1994 until 2019 of all employees, so not only in the manufacturing sector. The number of blue-collar workers continuously decreases whereas the number of white-collar workers increases accordingly. The other numbers of civil servants, trainees (this data has only been gathered since 2014) and self-employed remain relatively stable, even though a slight decline of self-employment can be noted.

Figure 4. Proportion (in %) of all employees in the different levels of employment from 1994-2019



Source: IAQ, Federal Statistical Office (Destatis), 2020, GENESIS-Online

Figure 5 shows the distribution of four different qualification levels within the German manufacturing sector in 2013 and 2017.

The Covid-19 pandemic has also affected the manufacturing sector. The Federal Statistical Office published a decline of 3.1% of all employees in the manufacturing sector in August 2020 compared to August 2019. Especially impacted were the metal manufacturing sector (-5.7%), mechanical engineering (-4.2%) and the automobile industry (-4.1%).

Figure 5. Proportion (in %) of qualification levels of all employees in the manufacturing industry

	Manufacturing industry	
	2013	2017
Assistant/helper (no or only minor specific knowledge required)	14%	15%
Skilled worker (fundamental skills and knowledge required, formal education)	60%	59%
Specialist (specific knowledge and skills, leadership, control, planning; further education)	15%	15%
Expert (most complex tasks, often higher education required)	11%	12%

Source: Federal Statistical Office (Destatis), Statistisches Jahrbuch, 2019. Online access

Dimensions of enterprises. Figure 6 shows the dimensions of enterprises in the German manufacturing sector in 2019. 99% of all enterprises are small and medium size (up until 499 employees) which are 3.5 million enterprises. Half of the enterprises have less than 50 employees, and only around 4% belong to the large size companies with more than 500 employees. The so-called *Mittelstand* or *KMU*, i.e. small and medium size enterprises, are therefore often considered to be the "engine of German economy, innovation and technology" (cf. German Association for Small and Medium-sized Businesses). The Federal Ministry defines all companies with less than 500 employees and less than 50 million Euro annual turnover as *KMU*, even though also bigger enterprises are counted as *KMU* if they are owner- or family-operated.

Figure 6. Dimensions of enterprises in the manufacturing sector (2019)

Total	<50 employees	50-99	100-249	250-499	500-999	>1000
46 900	49.7%	21.9%	17.9%	6.3%	2.7%	1.4%

Source: Federal Statistical Office (Destatis), Statistisches Jahrbuch, 2019. Online access

Level of digitalisation. A survey by Telekom from 2018 revealed that 47% of the companies in the German manufacturing sector have not initiated digitalisation projects yet. In 34%, a lack of knowledge and technical preconditions are the main reasons for that (Source: T-Systems survey, 2018).

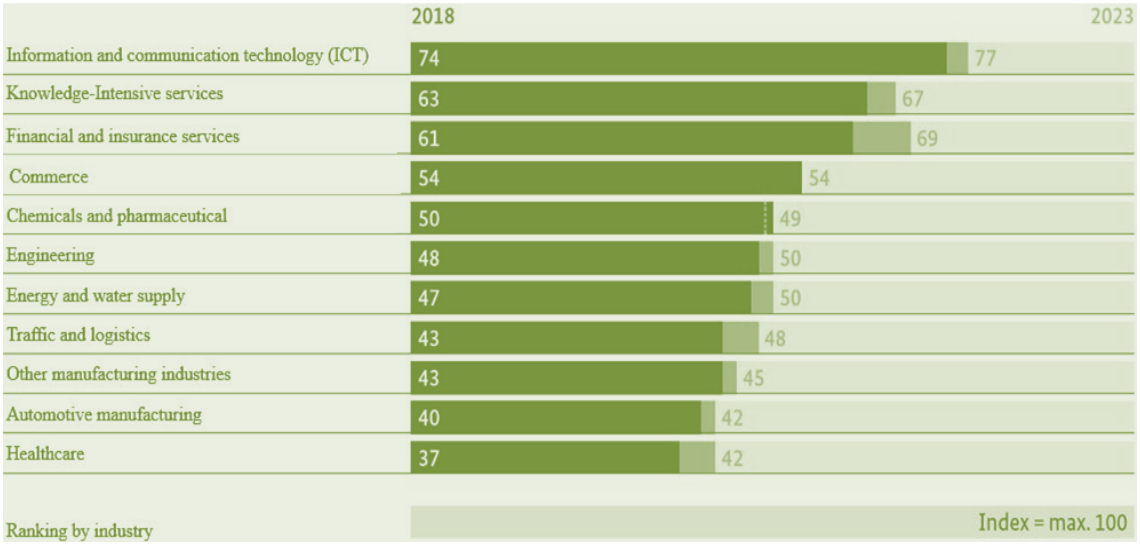
Figure 7 shows the degree of digitalisation by industry as it was determined by the study Economy index DIGITAL (*Wirtschaftsindex DIGITAL*) published by the Federal Ministry for Economic Affairs and Energy in 2020. It assigns points for digital business activity, for the degree of digitalisation of processes on company level and for the intensity of usage of digital technologies and services based on a survey of more than 1,000 enterprises in 2018.

The latest results show that there are big differences between the industries. The information and communication technology sector is by far the most digitalised whereas chemicals, engineering, energy, automotive manufacturing and other manufacturing industries are below the average of 54 points. The largest proportion with around 40% of all manufacturing companies belong to the digital middle field. Another 40% are graded late adopters and digital beginners – only 2% are considered to be digital pioneers.

The usage of innovative technologies is limited: only 9% of the industrial enterprises use Industry 4.0, 10% use 3D-printing and 17% use robotics and sensor technology.

In general, the study observed a change in trend: in 2016, 48% of all industrial enterprises claimed digitalisation projects to be unnecessary, whereas only 29% agree with that in 2018.

Figure 7. Degree of digitalisation by industry (2018-2023) (points given by *Economy index DIGITAL*)



Source: Federal Ministry for Economic Affairs and Energy, 2020

3.
FUNDAMENTALS OF INDUSTRIAL RELATIONS IN GERMANY

Unlike liberal market economies, which have a high degree of deregulation of their labour-relations, the German model embodies a centrally coordinated neo-corporatist model. This model includes a high degree of regulation through a comprehensive institutional infrastructure (Tüselmann, Heise, 2000, 163). The German system of industrial relations is characterised by collective bargaining between employers' associations and trade unions at **industry level** and negotiating processes between management and work councils at the **company level** (Pries, 2019). These bi-lateral negotiation processes are both determined by law and delimited from each other. At **industrial level**, collective agreements are concluded between trade unions and employers or employers' associations, which are constituted by the collective bargaining autonomy (*Tarifautonomie*). At **company level**, the regulations between employee representatives and management are legitimised by the Works Constitution Act (*Betriebsverfassungsgesetz*). In addition, works agreements can be concluded between these parties (Müller-Jentsch, 2017, 4ff). The right for collective bargaining is assigned to employers' associations and single employers on the one side and trade unions on the other side. Works councils are not allowed to negotiate over matters that are already regulated by collective bargaining, such as pay rates, unless there is an explicit opening clause in the collective accord. Once collective agreements have been concluded they have the force of law, which means that their provisions cannot be undercut and there is a strict peace obligation during their currency. Additionally, the agreements can be declared as generally binding to all companies in an industry by the Ministry of Labour, irrespective of whether they are members of employers' associations or not. Furthermore, the state provides a dense legislative framework on the conduct of industrial conflict (Tüselmann, Heise, 2000, 164).

Social partners. Almost 80% of the approximately six million German trade union members are organised in the eight single trade unions of the German Trade Union Confederation (DGB). The DGB coordinates and organises collective demands and activities of all member trade unions and represents them in contact with the government, political parties and employers' associations. The DGB is not actively involved in collective bargaining. The DGB is a

member of the European Trade Union Confederation (ETUC) and the International Trade Union Confederation (ITUC). The largest of the DGB unions with 2.3 million members is the Industrial Metalworkers' Union (IG Metall), which mainly represents employees from the metal and electrical industry (Schroeder, Greef, 2014, 127f.). 82% of the members are male and 18% female (DGB, 2020). The overwhelming majority of employees in the manufacturing sector are represented by IG Metall. The other important union of the manufacturing sector is the IG BCE (IG Bergbau, Chemie, Energie) representing workers in the chemical, mining and energy sector. IG BCE has around 620,000 members, thereof 78% male and 22% female (DGB, 2020). The most important negotiating partner of IG Metall in collective bargaining issues is the employers' association *Gesamtmetall*. Gesamtmetall is the largest member of the Federation of German Employers' Associations (BDA) and represents around 3,400 member companies with approximately 370,000 employees. The degree of organization of Gesamtmetall is approximately 15%. The *Bundesarbeitgeberverband Chemie e.V.* represents the interests of the employers of the chemistry industry and is the second most important association of employers.

Worker representation in workplaces. Compliance with collective agreements between employers' associations and trade unions is monitored at company level by the **works council**. Works councils can be founded in every company with more than five employees.

Co-determination rights. The works council possesses participation rights in social, personnel and economic matters. These range a) mere information, b) consultation to c) enforceable co-determination rights. The works council is encouraged to work with management in a trustful manner and can conclude works agreements with the management. The works council is an institution formally independent of the trade union, but members of the works council are often unionised and elected into the board via election lists. In addition, works councils are often supported by trade unions in form of advice and training. However, works councils are not one-sided representatives of the employees' interests but act as a "border institution" (Fürstenberg 1958) that balances the interests of employees, trade unions and management. Nevertheless, they are often the strongest advocates of the employees' interests on company level.

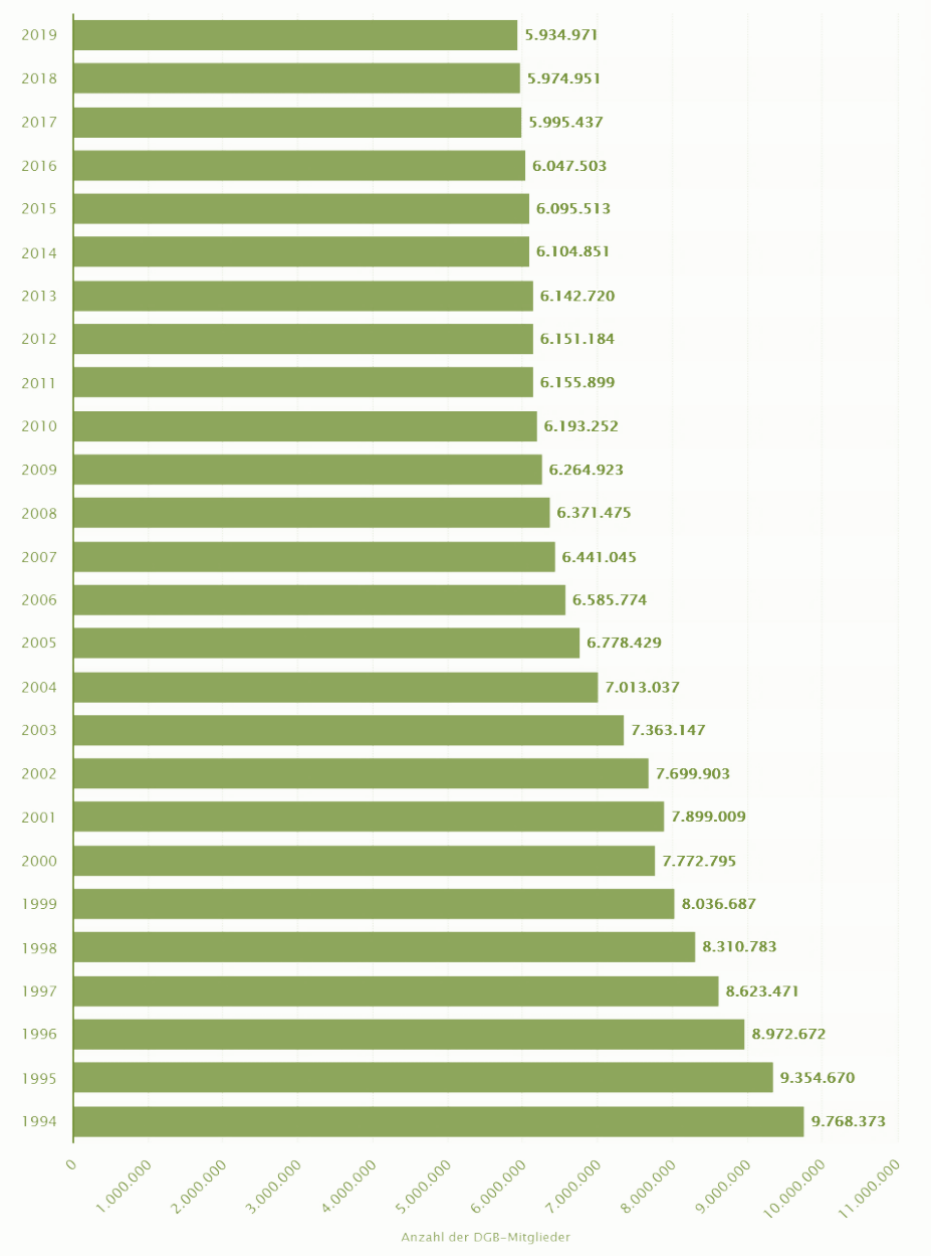
In addition to co-determination at the company level, there is co-determination of corporations. This allows employee representatives to participate in the Supervisory Board in both state-owned and privatised companies with more than 500 employees, which monitors the work of the board of directors. A special form of corporate codetermination can be found in companies in the coal and steel industry since the Supervisory Board is equally composed of representatives of the capital side and representatives of the employees. This form of co-

determination provides the most extensive rights to employee representatives, but it has lost much of its importance over time because these sectors have been shrunk considerably over the last decades (Müller-Jentsch, 2017, 56f.).

Trade union density. Since the late 1980s, both employers' associations and trade unions have seen a decline in membership (see figure 8). The decreasing number of members reduces the scope of the collective bargaining agreements concluded, which weakens employers' associations and trade unions alike (Müller-Jentsch, 2017, 35ff.; Greef, 2014, 723). This trend shows how much employers' associations and trade unions, despite their contradictory orientation, depend on each other to represent the interests of their members. However, numbers have been relatively stable for a couple of years now. Currently, around 18% of all employees are union members. 62% are covered by collective bargaining. Approximately 22% of all employees of the manufacturing sector are members in the IG Metall[1] and 9% are members of IG BCE.

[1] Of all 2.3 million members, 1.6 million actually work within companies of the manufacturing sector.

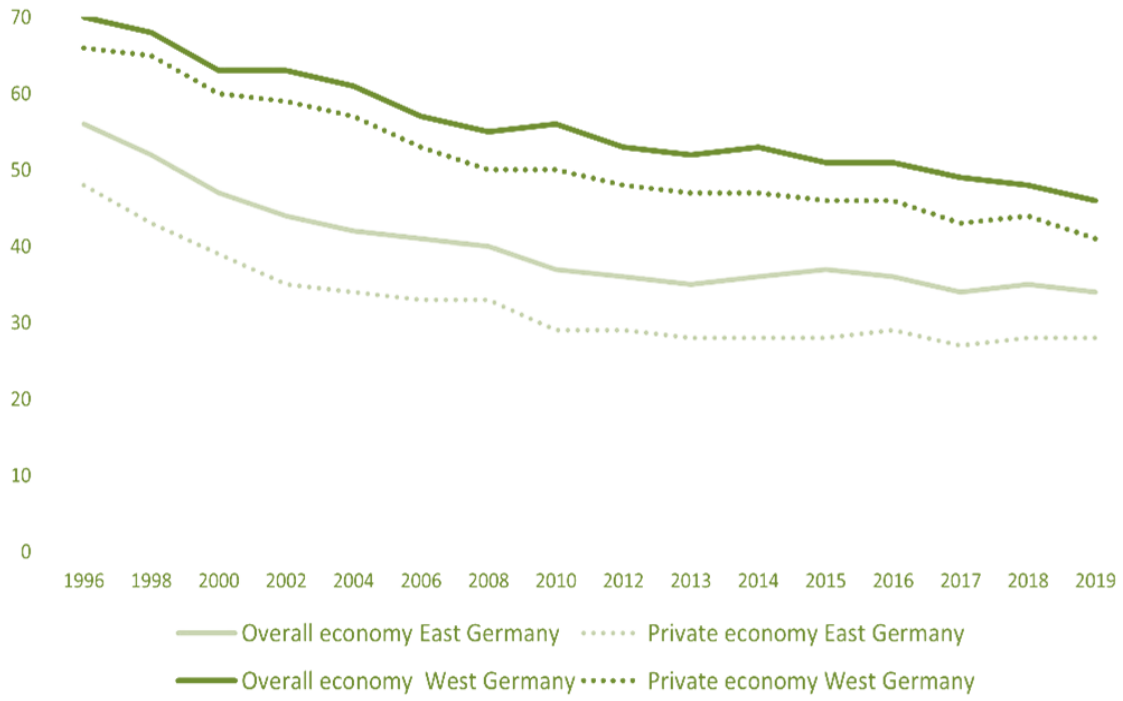
Figure 8. Development of the number of members in DGB trade unions (1994-2019)



Source: Federal Statistical Office (Destatis), 2020

Collective bargaining coverage. There is a big difference in collective bargaining coverage between the federal states that used to be the DDR and the former West states (see figure 9). In general, 46% of all employees are included in collective bargaining contracts. In the manufacturing sector, that is true for 45% of the employees. Overall, 25% of the enterprises are covered by collective bargaining contracts.

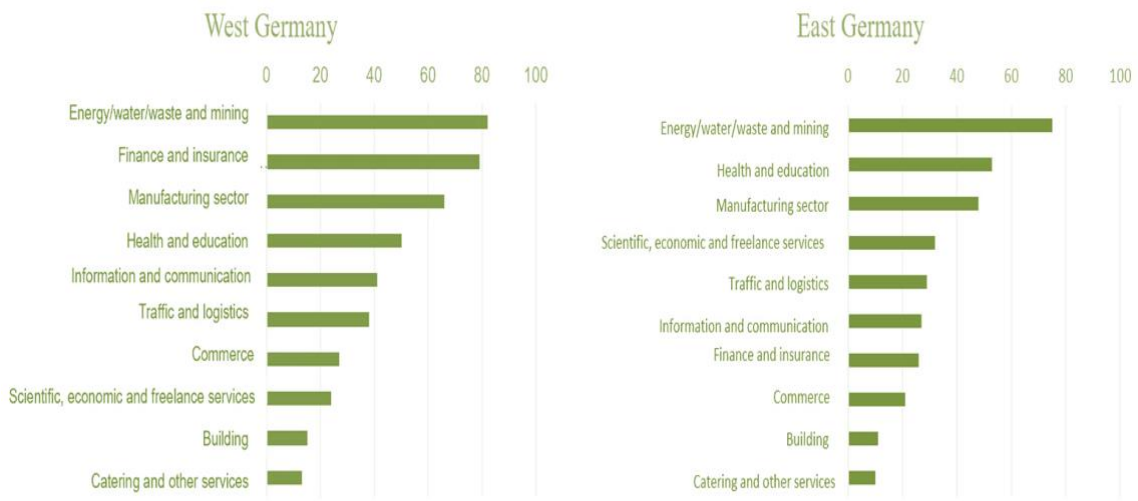
Figure 9. Development of collective bargaining coverage (1996-2019) in percent



Source: own design based on IAB Establishment Panel, 2019

Also, when it comes to the distribution of works councils, there are differences between the former West and East states of Germany as figure 10 shows. The manufacturing sector as well as the energy, water, waste and mining sector, belong to the industries with the strongest representation on workplace level.

Figure 10. Distribution of works councils in West and East Germany by industry in % (2019)



Source: own design based on IAB Establishment Panel, 2019

Main priorities and issues at stake

Digitalisation. The digital transformation will tremendously change and already changes the production industry. However, the processes included under this umbrella term do not only affect technological processes but also the way people work and live. The trade unionists interviewed stated very clearly that both IG Metall and IG BCE have understood that it does not make sense to fight against digitalisation but that they need to involve themselves forcefully in decision-making processes. Many companies in the manufacturing sector feel the pressure to promote digitalisation to remain competitive in comparison to "new" players such as China. However, they often feel unprepared for the technological challenges. One of the main reasons for that are the palpable demographic change happening in Germany – the so-called "baby boomer" generation (1960s) is approaching retirement age without appropriate replacement on the horizon. Partly, that is because the younger generations have different attitudes and expectations towards work, e.g. concerning work-life-balance, the compatibility of family and work or working times. In addition, in some regions, especially eastern Germany, younger people are also often missing – plain and simple. Companies, especially in the manufacturing sector with its relatively high percentage of manual labour, have a lot of trouble to find skilled workforce that is willing and capable to deal with the challenges of digitalisation. Therefore, qualification is perceived to be a key measure in shaping the digital transformation – often, the trade unions talk about "Education 4.0" in the context of Industry 4.0.

Resource efficiency. Climate change is a global challenge and since the manufacturing sector is an important source of CO2 emissions, it is only a matter of time when true changes become necessary. IG Metall has engaged in conversations with climate activists and has put the topic on its agenda (e.g. *#fairwandel* protest in summer 2019). The trade unions of the manufacturing industry want to produce "better not cheaper" and maintain competitiveness and an advantage of location by focusing on high quality of production and innovation. However, to reach this goal qualification is once again seen as decisive. Another promising factor is interconnectivity.

Interconnectivity. Interconnectivity is the central characteristic of the vision of Industry 4.0. Technical preconditions for a successful implementation of interconnectivity are intelligent and digitally connected systems that allow for an almost autonomous production. Humans, machines, logistics and products communicate directly and in real time with each other. In order to make older but still perfectly fine machines fit for Industry 4.0, companies can draw on retrofitting. By installing all kinds of sensors into machines, they can communicate via different systems, e.g. Manufacturing Execution Systems. In addition, this process allows to keep machines longer, prolonging their operation time and thereby saves resources. This can be a solution especially for small and medium size enterprises (*KMU*) that make up 99% of all German enterprises because it would often not be possible for them to invest in new, already fully digitalised machines.

Artificial intelligence. Artificial intelligence (AI) is often considered to be *the* important technology of the future even though hardly any company has already implemented AI systems. Trade unions see them as offering both chances as well as risks: AI can relieve employees and create employment of higher quality and qualification, e.g. if it takes over monotonous, tiresome or even dangerous work. However, at the same time, they also pose a threat to employment and can cause scepticism. Therefore, the trade union representatives state that an early involvement of all social partners in decision processes is the key to a successful and sustainable implementation of AI.

Electrical mobility. The mutual goal of industry and trade unions is to make the German automotive industry the leading one world-wide as most exported goods come from that sector already. The challenge is to develop an arrangement that is economically valuable, socially acceptable and sustainable. To this day, it is not sure how many jobs will be lost in the transformation of the automotive industry because new fields of work emerge while some are lost. The German trade unions proactively approach this challenge and involve themselves in processes of change.

Mobile work. The Covid-19 pandemic has forced many people into home office and mobile work. Some companies had

already set up structures for that, others had to develop them in short time. This period has shown that mobile work has both advantages and disadvantages, but all interview partners stated that more employees demand to have a right on home office also in the future. The challenge will be to come to an agreement that suits both the employees and employers and that is safe, ergonomic and in line with the principles of "Decent Work" (well paid, safe, humane, with opportunities of qualification and promotion).

Health and safety. There is often a lot of scepticism around new technologies, especially when it comes to the aspect of health and safety. There is not enough research yet and employees who have become used with a certain way of working and "their" machines, often have a hard time when new technologies are introduced. Therefore, the trade unions and the works councils who have co-determination rights in health and safety matters, have recognised this topic to be central. The design and usage of digital technologies has to be human-centred and supportive of the human actor, not the other way around.

4.
APPROACHES AND PRACTICES OF NATIONAL TRADE UNIONS FOR DIGITALISATION IN THE MANUFACTURING SECTOR

General approaches and practices of national trade unions

Vision and attitude.

- Digitalisation and the vision of Industry 4.0 is generally perceived to be both a challenge and a chance. Positive outcomes are expected if new technologies are a product of codetermination and participation.
- Trade unions have understood that it does not help to fight against digitalization (since it is happening anyways) but to make sure that it is proactively shaped in the sense of workers.
- Qualification is considered to be the decisive variable in coping with digitalization.
- Technology is understood as neither good nor bad but highly dependent on the way it is used and designed.
- Digitalization has already impacted companies tremendously and will continue to do so in the future.
- Digitalization affects all areas of work – especially in the fields of qualification, data protection, working time, health and safety, remuneration etc.
- Trade unions aim at bringing in the human-centred perspective into the discourse instead of only focusing on the technological side of the topic.

German trade unions do not show large ideological differences. That is because they are centralised under the umbrella organisation DGB and because they are independent from political parties. Naturally, there is a relative closeness to political parties traditionally representing workers (such as the Social Democratic Party, SPD) and a consensus on the values of democracy – leaving out the nationalist and right-wing populist party *Alternative for Germany* (AfD). In general, however, trade unions must remain independent from political parties. They are prohibited from calling for political action – their field of action is bargaining. Therefore, there are no considerable differences in their approaches to and perspectives on the challenges of digitalisation.

Research activities. IG Metall cooperates with the Ruhr-University Bochum in several research and qualification projects. The most influential one was "Work and Innovation" (*Arbeit und Innovation*) (2016-2019), funded by the European Social Funds and the Federal Ministry of Labour and Social Affairs with around 5

million Euro (see below, under "training activities").
IG Metall has also a department called "Future of Work" (*Zukunft der Arbeit*) dealing with research activities.

Communication and awareness-raising campaigns. Works councils are supposed to be made fit for action concerning all the challenges of digitalization and function as multipliers. In the project "Work2020+" (*Arbeit2020+*) works councils are supported in finding the specific answers to their individual questions and challenges since 2015. The topics range from resource efficiency, new products, new working methods etc. It is a cooperation project of different trade unions (IG Metall NRW, IG BCE Nordrhein, NGG NRW, IG BAU Rheinland and DGB NRW). The project is funded by the Federal Ministry of Labour and Social Affairs and the European Social Funds until 2021.

Training activities. "Work and Innovation" project was aimed at qualifying workers' representatives and internal company experts to deal with digital transformation and possible upheavals in the workplace. It was a praxis-oriented learning process, whereby a well-structured training programme was developed in tandem with and as a function of company-specific innovation projects, whose implementation was ensured and supported via the involvement of IG Metall officials and external advisors. As a result, "Work and Innovation" consisted of two interrelated parts: a qualification programme articulated in different modules; and the implementation of and support for company-level innovation projects accompanied by subject-specific counselling. More than 100 companies participated nation-wide. One part of the qualification programmes took place in the socio-political learning and research factory of Ruhr-University Bochum, offering a very practical and holistic learning experience. The socio-political part of the learning factory has been constructed in a close cooperation of Ruhr-University (Office of Cooperation and Chair of Production Systems) and IG Metall.
IG Metall has started a follow-up project in 2020 called "transfA+Ir". Within the next two years, they will develop tool kits for full-time trade unionists and workers' representatives, so that they can deal with all kind of topics related to transformation on company level. The focus will not only be on digitalization, but also on other aspects of transformation. The tool kits will be tests by starting and supporting innovation projects in 14 companies.

Lobbying and social dialogue. IG Metall has close contact with governmental structures, e.g. the Ministry of Labour and Social Affairs. However, it is mostly the DGB as an umbrella organisation that represents the interests of the trade unions in political discussions.
Social partnership is seen as decisive – only by combining efforts, qualifications, perspectives and goals, digital transformation can be mastered, and fears can be addressed.

Collective bargaining and co-determination. IG Metall has a collective bargaining agreement dealing with mobile work in the metal and electronics sector. It provides a definition of mobile work and guidelines for companies to develop company agreements. These voluntary company agreements are the framework for individual arrangements about frequency, location, duration and time tracking of mobile work. Among others, these guidelines include a) that mobile work has to remain voluntary, b) that employees that refuse doing mobile work are not to experience any disadvantages, c) that legal directives are fulfilled. Employees are not obliged to be accessible off-time.

IG BCE hosted a symposium called "WORK@INDUSTRY 4.0" where social partners from the chemistry industry came together and developed strategies, solutions, perspectives on how to deal with digital transformation together.

As an example of a practice of co-determination, at BASF Personal Care and Nutrition GmbH, a "Digi challenge" was organised in 2019 – some kind of fair where all employees were asked to contribute and discuss ideas and concepts on how the production and processes could be digitalised further. The workshops took place with a deliberate mixing of different expertise fields, employment levels, qualifications, skills and departments.

As soon as work processes and procedures are affected, any technological change or implementation of technical systems is subject to the information and consultation rights of the works council (§90 of the Works Constitution Act). However, in a study ("Imit^2: participate – co-create") on the level of Industry 4.0 implementation in the federal state of North-Rhine Westphalia, it was shown that digitalisation is an incremental process without clear path dependencies. More than 50% of the interviewed works councils stated that the employer informed them only after requesting information, in 5% of the cases after multiple requests (Lins, Ruhe, Bicer 2017, 106). Also, the employees consider their opportunities of participation as deficient, whereas management representatives stated that they indeed involve employees and works councils in decisions, planning and implementation (ibid. 142). The study also showed that works councils who have participated in qualification programmes are more frequently involved in technological processes of change (ibid. 143). However, only a minority of works councils feels well prepared to be able to participate in matters of digitalisation – a result that shows the importance of qualification. In addition, qualification of works councils also leads to a significant increase of company agreements on digitalisation or Industry 4.0 (ibid. 145).

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