



This action has received funding from the European Union
(DG Employment, Social Affairs and Inclusion)



Literature review and expert interviews - National Report Germany

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Working paper, Herne, Germany, November 2018

Table of content

1	Introduction.....	3
2	Methodology section	6
3	Digitalisation related restructuring and Social Dialogue in selected sectors.....	7
3.1	Tourism.....	7
3.2	Financial services (bank/insurance),.....	10
3.3	Postal services / Logistics	12
3.3.1	German letter and CEP market.....	14
3.3.2	Logistics in industrial value chains	16
3.3.3	Interim conclusion.....	17
3.4	Manufacturing industries.....	18
4	Conclusion section.....	21
5	References	24

1 Introduction

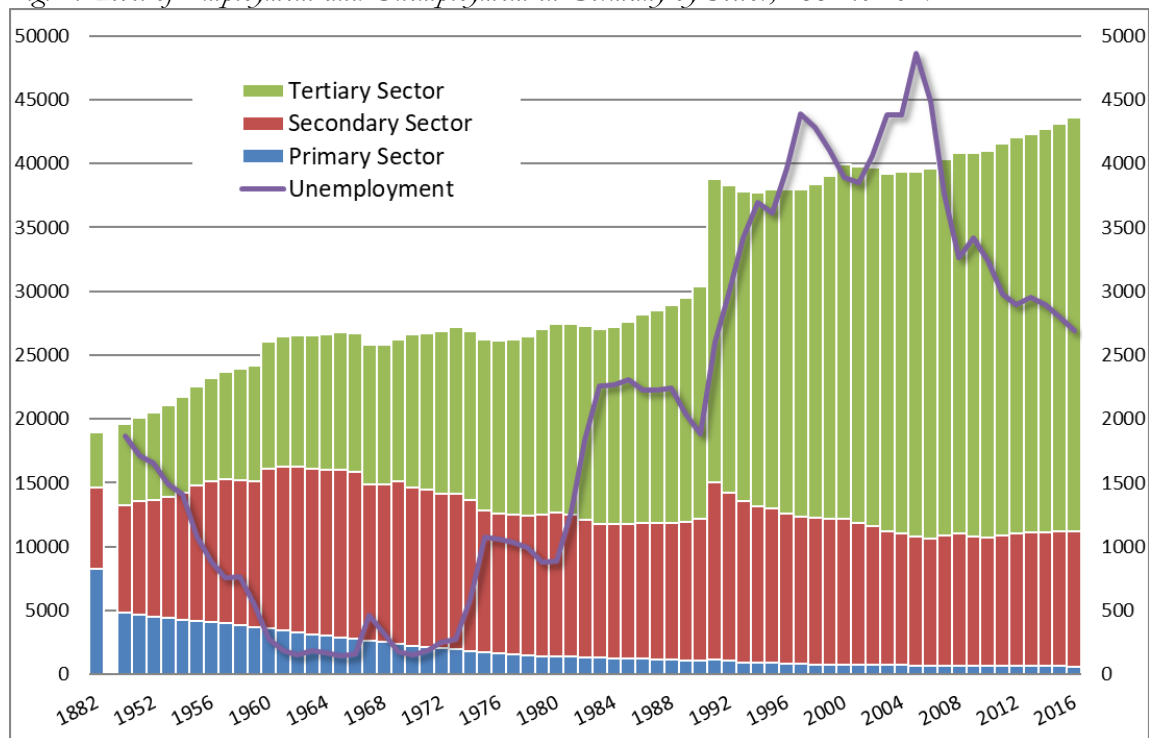
In industrial and labour policy debates, digitalisation and the so-called Internet of Things have been a dominant topic for several years. The buzzword of the German debate is "Industrie 4.0". The term was introduced at the Hanover Fair 2011 and, unlike any other, has sparked a discussion about the technical future of the industrial production, which has been reflected in countless publications, conferences and also operational pilot projects in companies. The future expectation that "Industrie 4.0" stands for is based on a radical, partly disruptive change in productive models, which is induced by digital technologies and whose quality corresponds to what is known as a fourth industrial revolution. This revolution, so the idea, leads to largely digitized and virtualized production systems not only in the industry, but also in the service sector (Ittermann / Niehaus 2015).

These radical and "high-flying economic expectations" (Pfeiffer / Huchler 2018) have recently produced cautious and skeptical assessments of the consequences of digitalisation. Noteworthy here is a broad debate on labor policy, which includes slogans such as *Arbeit 4.0* (Labour 4.0), *Mitbestimmung 4.0* (Co-determination 4.0) and others. Particularly the topic of labour has gained in importance through a Green and a White Paper of the Federal Government; the latter paper understands Labour 4.0 as a "necessary complement to the discussion on [...] Industry 4.0". (BMAS 2017: 8).

The German discussion about the future of work in a more and more digital world is characterized by several topics with different weightings:

One focus is the implication of digital rationalization and modernization on employment. Here, digital technologies were and are seen as a threat, often with reference to the study by Frey and Osborne (2013, see also Brynjolfsson / McAfee 2014, for Germany: Bonin et al., 2015). The forecasts of job cuts have not yet been realized in the German labour market, and the current performance and robustness of the German labour market indicate that the opposite is the case (see Rinne / Zimmermann 2016: 5; Dengler / Matthes 2015, see Figure 1).

Fig. 1: Level of Employment and Unemployment in Germany by Sector, 1882 to 2017



Source: Destatis, Bundesagentur für Arbeit (Public employment service), own calculation

A second subject area includes, roughly speaking, the prospective quality of work in digital production systems and the requirements of digitization for work conditions as well as qualification and competence development.

A third labour policy issue revitalized by digitalisation is the flexibilisation and demarcation of labor, and, closely linked to it, an acceleration of the trend towards marketization and decentralization of human resource and corporate management by methods such as crowdsourcing or crowdworking (Hirsch-Kreinsen et al. 2018: 179f.).

In all these threads of the German debate it is common to “emphasize the openness of the future” (Haipeter et al., 2018). The openness is evident in the fact that an important means of the debate is the development of change scenarios of the German employment system. A starting point are dichotomic patterns like the differentiation between the “automation scenario” that has got a negative connotation from a labour policy perspective, and the (positive) “tool scenario” (Windelbrand 2014). Ittermann and others developed a differentiated scheme (Ittermann / Niehaus / Hirsch-Kreinsen 2015; Kreinsen 2016, Ittermann / Niehaus 2018). The background of their scenarios is to summarize in a pointed way the state of research and arguments on the various future concepts (“Industry 4.0 (...) revisited”). The authors develop a positive scenario based on an understanding of Industry

4.0 as "promising technology" (Hirsch-Kreinsen 2018). It strengthens a trend towards the revaluation of industrial work and sees employees as the future "conductors of value creation". Opposed to this optimistic view, they present a dystopian scenario that points out arguments that speak for the loss of workers' rights, for a general devaluation, and a quantitative loss of importance of industrial work. A third scenario combines the first two approaches into a polarization trend in which the middle tier of qualification is one of the losers of digitization, and winners include the high-skilled employment segment as well as the segment of trivial and easy work. A fourth scenario focuses on the flexibility of digital technologies. It points out an erosion of internal labour markets (in the sense of i.e. Doeringer / Piore 1971) by an increasing boundarylessness of work and the gaining importance of precarious work. The motor of this development are work forms like cloud and crowd working that become the dominant feature of the employment systems.

Due to the scope of the industrial policy discussion on digitalisation, this radiates on the practice of the co-determination of employees, which is based on the BetrVG. This right to co-determination on company level and additionally the collective bargaining autonomy form the "core of the German co-determination model" (Matuschek / Kleemann 2018). Digitalisation has a strong operational policy component; central actors of co-determination are the works councils, to which the BetrVG grants various rights of participation, consultation and information. In the context of digitalisation, two rights of the works council are in the center: on the one hand co-determination in the introduction and application of technologies for performance and behavioral control of employees (§87 (1) BetrVG), on the other hand, the information and consultation rights of the works council on change the company organization, the introduction of new working methods and manufacturing processes and other ("Change of operations", §111 BetrVG). The central means of operational regulation of industrial relations are company agreements concluded between employer and works council (§77 BetrVG) (ibid .: 228).

From the combination of employee participation and digitalisation, various issues are currently being discussed. Central to this are the requirements for employee participation and the role of works councils in the operational design and regulation of digital work processes and business models (Haipeter et al., 2018). On qualitative basis, Georg et al. (2017) have examined different companies and different approaches of works councils to the digital transformation. They summarized their results in a typology, within which differentiate works councils based on the level of knowledge acquisition and range of involvement. They

form four real types of behavioral patterns of works councils in the digitalization process: (1) the pragmatic works council, (2) the reactive works council, (3) co-digitizers, and (4) the satisfied works council.

In addition to the question of the role of works councils in corporate digitalisation strategies, the possibilities of digital technologies for participation are also discussed in this context, i.e. the use of new forms of communication by works councils to bridge spatial and temporal distances, to shorten decision-making paths or to involve employees' opinions in the work of the works council (Guhleemann et al., 2018). Co-determination 4.0 as a "new model of co-determination" (Haipeter 2015) is an attempt to combine both issues. The challenges of designing and regulating new labor-policy requirements are difficult to imagine if "they do not use digital technologies themselves" (Haipeter, 2015: 318).

Another aspect of the topic of Industry or Work 4.0 is the labour-policy claim of the trade unions (Haipeter et al. 2018), in particular the IG Metall, the metal workers union. This is expressed in two projects, the project "Work and Innovation" of the IG Metall and the project "Work 2020", carried out by the IG Metall, trade unions of other industries and the DGB, the German trade union umbrella association. Both projects offer works councils extensive support structures through advice, qualification and support with working methods. On the one hand, they show that there are major organizational and organizational obstacles on both the employers' and the works councils side. These obstacles can be overcome, however, and can lead to form an collective agreement between the works council and the employer on digitalisation and the company's future (Haipeter et al. 2018: 255f.).

In addition to the problems of digitalisation on company level, it is also called and problematized as a general political task, in particular according to shifts in the balance of power. These are to the detriment of the workers and contribute to the "digital loss of security" of work, to the processes of de-collectivization and deprivation. Political initiative and legal regulation is required for the containment of these digital risks (Schwemmler / Wedde 2018).

2 Methodology section

The aim of the following reports is first to provide a brief introduction in the productive models of the selected sectors of the Diresoc project in Germany, second to give an overview about the state of the digitalization and its impact on employment and working conditions. Third, each section will summarize the sector-specific debate on labour policy,

industrial relations related to digitalisation and the impact of digitalisation on co-determination.

The data base of the report is two-fold. Its first base is literature research, the second base are semi-standardized expert interviews. Due to the explorative character of the report, the variety of Target persons is broad from managers and works councils in sector-related companies, trade unionists, researchers and sector-specific experts. A list of interviews is provided by table 1.

Table 1: Table of Interviews

Abbreviation	Role of Actor	Organization
Int_1_Tourism	Tourism manager	Municipality of N-Town
Int_2_Tourism	Sectoral Expert	Regional Association of the Tourism Industry
Int_3_Tourism	Digitalization Expert	Regional Association of Tourism Industry
Int_1_FinServices	Trade Union Secretary	Ver.di / Trade Union for the Service Sector
Int_1_Logistics	Trade Union Secretary	IG Metall / Metal workers union
Int_1_Industry	Works Council	A+I-Company
Int_2_Industry	Trade unions representative	IG Metall / Metal workers union
Int_3_Industry	Trainer for digitalisation strategies for works councils	Centre for professional training for the metal sector
Int_1_DigiExpert	Project Manager in digitalisation research	University of Dortmund
Int_2_DigiExpert	Resercher in the field of work and digitalisation	University of Bochum

3 Digitalisation related restructuring and Social Dialogue in selected sectors

3.1 Tourism

In Germany, tourism is seen as a heterogeneous and cross-sectoral business area whose economic importance in national public and economic policy perception tends to be underestimated, according to tourism associations. "Nearly three million people work in this country in tourism. Millions more jobs depend on tourism. With these numbers of employees as well as our share of around four percent of the gross value added, the tourism industry is

still on a par with sectors such as mechanical engineering or finance ", said the President of the Federal Association of the German Tourism Industry (BTW 2017: 7). The figures are based on a study commissioned by the Federal Ministry of Economics for the economic performance of the tourism industry, which in its entirety is not covered by the system of official statistics (ibid .: 12).

Because of its characteristics as a cross-sectoral business, tourism value creation is divided into two core areas: the production of tourism products (overnight accommodation, travel and other services) and their marketing.

In order to differentiate business models and services in tourism, a distinction is made between different categories of travel and visitors. According to World Tourism Organization, three criteria of travel are constitutive: duration (overnight vs. day tourists), motives of travel (holiday, business trip, pilgrimage etc.) and the travel destination (for example, domestic / foreign). After these elements can form different travel groups, which have typical differences in travel behavior. For example, when traveling abroad to Germany, the share of private, multi-day overnight stays dominates with 66.0 percent of all journeys, while the share of business day trips is 2.6 percent. When traveling by residents in Germany, the proportion of private overnight stays is 37.1 percent; business day trips have a significantly higher share of 8.2 percent compared to foreign guests.

Important trends in the tourism industry are digitalisation, including the platform economy, as well as increasing individual mobility, the individualisation of travel, and demographic change, in particular the increasing proportion of older people affecting travel behavior. Another trend is general prosperity growth, especially in emerging countries, which increases demand for travel in general. In the context of digitalisation, the tourism industry draws a different picture due to the heterogeneity of the products and services associated with it. The greatest relevance of digitalisation is seen in the area of marketing, where platform economics visibly changes the structure of distribution channels. A tourism manager:

"Digitalisation of the tourism industry is a huge issue, especially the sale of services via the internet and the internet in destination marketing" (Int_1_Tourism)

This is a view shared by the relevant tourism associations and professionals: "Digitalisation of the economy is also a highly relevant driver of change in the tourism industry: falling transaction costs, the use of big data and disruptive business models through digital platforms are changing the industry at a rapid pace. This is particularly evident in three sub-

sectors: business models in the field of tourist services, accommodation and passenger transport are undergoing profound change"(BTW 2017: 41).

The question of the effects of digitalisation on the German tourism industry is often described as the simultaneity of opportunities and risks:

"The threat is the platform economy, where large players and platforms dominate with huge market shares, for example AirBnB [...]. Anyway, if you make digitization right, then it leads to an increased number of visitors on site. That means extra work and finally an increase in employment" (Int_1_Tourism)

The view also shares an industry expert from a tourism association: "The attitude [to platform economy] has changed from the negative to the positive. The positive has arrived in the minds, there is now a growing acceptance of the platforms" (Int_2_Tourism).

Apart from the platform economy, the key figures in the industry "do not yet show any major effects [of digitization] on the macroeconomic importance of the tourism industry," according to the tourism association (BTW 2017). The tourism industry is "not [considered] in the sectoral comparison as a pioneer in terms of digitization" (Hoppe 2018: 11). This also applies to the area of labour and employment (ibid.: 56). A study on the influence of digitalisation on the development of employees in Germany (Dengler / Matthes 2015) concludes that there is only a small potential for digital substitutability in the sector-relevant occupations. This also explains the digital optimism that has become evident in the tourism-specific expert interviews that explicitly include the field of labour. The representative of an interest group explains:

"According to all the possibilities offered by digitization: In Tourism, the human factor is always essential. People who go to a restaurant want a cook in the kitchen. Hotel guests expect a person at the reception. That is our credo. And in the future, good and skilled workers will be needed for that" (Int_2_Tourism).

Related to this is another argument that another expert brings in. He explains the special role of the human factor in tourism services by saying that "travel and tourism are emotional issues [and], and this subject, this service need real people. The experience on the spot is important, here at the museum visit, there when checking in at the hotel". For all non-on-site services, most of the communication is digital, and new forms of communication affect work and working conditions.

“People look at their cell phones 100 times until they build a decision as a tourist. We see that most of the requests and communication comes from the online world, which we know from media value analysis” (Int_3_Tourism).

The change in communication and information behavior also affects traditional websites, which are losing importance in favor of apps and social media, which are well suited for communication and marketing since they fit to the emotionality of tourist products. However, they lead to new demands on communication work, which has become more individual and interactive and i.e. can no longer be reduced to core working hours, according to the interviewee.

"Facebook and Instagram do not stop on Friday at 5pm, but also want to be maintained on the weekend. And that applies to many players, including the hotelier in the Sauerland [a rural touristic area in Germany – GM], who has to see that he is on the relevant platforms, that he receives good reviews, and so on"(Int_3_Tourism).

What are the requirements for work organization, participation, and co-determination within the tourism industry? According to the standards of decent work, on the one hand a strategic competence development is necessary, on the other hand the operational regulation of working hours and mobile work, in order to counteract eroding spatial and temporal boundaries of work. Due to the system of dual vocational training, Germany seems to be well equipped to meet the growing demand for qualification in tourism professions due to digitalisation (Hoppe 2018: 64). However, the corporate design of the digitalisation of work by works councils is facing particular hurdles. Works councils in tourism often operate in operational service and have a systematic lack of required expertise (ibid. : 76f.), which is needed to regulate work effectively in the context of digitalisation.

3.2 *Financial services (bank/insurance),*

The financial industry in Germany is often characterized as a so-called universal banking system; in contrast to the type of the separation banking system, banks in Germany are licensed as fully-fledged banks and generally offer the full range of services that can be derived from the banking functions. Another central feature of the German financial sector is its three-part division ("three-pillar system"), it consists firstly of private commercial banks (i.e. Deutsche Bank, Commerzbank), secondly public-law banks (i.e. *Sparkassen*, savings banks) and thirdly the cooperative banks (i.e. Volksbanken and Raiffeisenbanken), which are banks characterized by the legal form of a registered cooperative (see Jovanovic / Voigt 2016).

After a long period of relatively quiet sector development in a regulatory environment, the market has become much more dynamic in the recent past. The reason for this is the change in specific framework conditions, including the current low interest rate situation, growing regulatory requirements and processes of consolidation, internationalisation and digitalisation.

Among the DIRESOC sector selection, the digitalisation of the financial sector, even if it has different facets and effects, has the greatest dynamics. In terms of the market, one effect is an increasing competition through the emergence of new market players, such as FinTechs as new digital competitors and the big internet companies like Apple, Google, Facebook etc. The further they “extend their product offering beyond payment services to other financial services, the greater the risk to traditional credit institutions” (Jonietz et al. 2018: 373).

In addition, digital technologies have far-reaching possibilities of rationalizing internal processes and interfaces with customers and suppliers. With regard to the development of digital business models, even traditional banks are considered as "early adopters". The banking industry is “particularly affected by digitization since, just as in the software or media sector, the core products are almost or even completely based on information. In principle, the collection, transmission and processing of information by means of IT can take place without delay or in real time” (Alt / Puschmann 2016: 1).

Overall, within bank three digital application areas can be distinguished:

- The internal use of IT systems to streamline internal processes;
- the digitization of customer interaction as well as
- the interaction with service providers.

According to all these areas, experts and interviewees rate the sectoral rationalisation potential of digitalisation as very high for specific employee groups. Studies conclude that "the fears of a massive job losses in the context of a continuing digitization are currently rather unfounded", does not seem to apply to large occupational groups of the banking and insurance industry. An industry expert from the union:

"What we still have today with simple work processes, for example scanning, etc., will soon disappear. In classical processing, I think there are very high automation potentials. Fifty percent of employees lose their jobs, such scenarios are not exaggerated. Take the insurance industry. In the past, there were discussion and negotiation processes in insurance casework, today, 80 percent are automatic. No

one looks at it anymore. The classic insurance salesman is a dying breed" (Int_1_FinSector).

The same applies to other areas with (still) large employment figures, such as accounting. Limiting certain qualification levels, besides simple activities, also qualified and highly qualified employees are affected by digital rationalization. "The wave of automatisisation has already begun, but not yet reached its peak," said a works council member from the financial industry.

Another digital transformation is attested to sales and the interface to the customer. Here global companies like Google or Amazon are seen as a threat that could fill this strategic interface based on their potential customer data. "It's an open question as to whether the industry will stay that way or whether Internet companies will take over the business, leaving current companies as suppliers," said a union representative (Int_1_FinSector).

From a labor policy perspective, it can be said that job cuts and employment security are the central problem areas of this sector-specific digitalisation. Issues of work design have a lower significance, but nevertheless have a high urgency because of the great change dynamics. The focus is on questions of qualification, the design of mobile work and agile management and working methods.

In terms of employee participation, digitalisation, like that of the tourism industry, leads to excessive demands of works councils. In addition to the requirement of specialist knowledge, this is supported by the "constant crisis mode" in which works councils are always placed. One restructuring project is chasing the next one "(Int_1_FinSector). The rate of change in companies is so high that the co-determination in its existing forms cannot always react effectively, according to the union representative.

This creates permanent conflicts between employers and works councils, and attempts by employers to deviate from employee participation: "The employer says we need more speed. We need innovation, you [the works councils - GM] are the brakes". At this point, in addition to the business practice, the political position of employers becomes apparent, which increasingly aims at weakening co-determination in the context of digitalisation.

3.3 Postal services / Logistics

In the original sense, logistics is the organization of supplies with material and persons in the military field. The term found its way into the sphere of economics in the post-war period

and today designates the (civil) planning and provision of the means and services required for production as well as the distribution of products to the customers. The traditional tasks of logistics are transport, handling and warehousing; in the modern understanding of logistics, planning, control and scheduling also continue to be their central tasks.

Like tourism, logistics is a cross-sectoral field of business that is not covered by official statistics (Kübler et al. 2015: 3f.). One way of delineating employment in this field is to identify typical occupational groups in logistics. Kübler et al. (2015), a study on employment in logistics shows a total of 2.48 million employees (2014); this corresponds to a share of total employment of 8.3%. These are divided into three occupational groups as follows:

- Transport and delivery jobs, such as delivery staff, drivers of trucks, skippers etc .; this group accounts for about 26% of logistics employment.
- Warehousing and transshipment occupations account for the largest share of logistics employment at 53%.
- Commercial and administrative occupations in logistics account for 21% (Ibid .: 5).

Further subdivisions of the logistics industry into submarkets are based on transport routes (road, rail, ship, air) as well as on functional aspects. Following Schwemmer (2016), Zanker (2018) distinguishes six major submarkets in logistics:

- Cargo transport, bulk logistics
- General cargo transport
- Contract logistics
- Post and CEP services
- Terminal services, warehousing
- International transport and logistics services

Due to the polarized situation in terms of work and working conditions, the logistics industry can be well differentiated in terms of the depth of regulation. Zanker (ibid.) Develops two types of regulation:

- Large companies in logistics tend to be governed by collective bargaining agreements, employee participation is governed by works councils, and working conditions are usually good.

- Collective bargaining agreements are generally not applied in the SME sector. "Co-determination [does not take place] due to lack of institutionalized representation of workers interests" (ibid .: 122).

The relationship between large enterprises and SMEs is highlighted in a typology on working conditions set by Holst and Singe (2013) for courier, express and parcel services (CEP services), which illustrates the depth of segmentation of the industry. As a cause of the differentiation the authors see the outsourcing strategies of the dominating large enterprises of the type 1:

- Type 1 includes the five major global corporations that occupy a dominant position in the German market. They have differentiated functional areas for controlling and planning the overall organization. Two of the "Big Five" have their own delivery workers, with priority being given to workers who have completed vocational training.
- Type 2 consists of small-scale subcontractors with usually up to 20 employees. They are owner-managed, they offer no career opportunities due to a lack of administrative jobs, their recruitment channels are clearly different from the type 1, they recruit mainly unskilled workers.
- Type 3 are so-called "drivers-of-their-own" or "micro-enterprises without their own workforces" (ibid .: 48), with which some of the major parcel services cooperate.

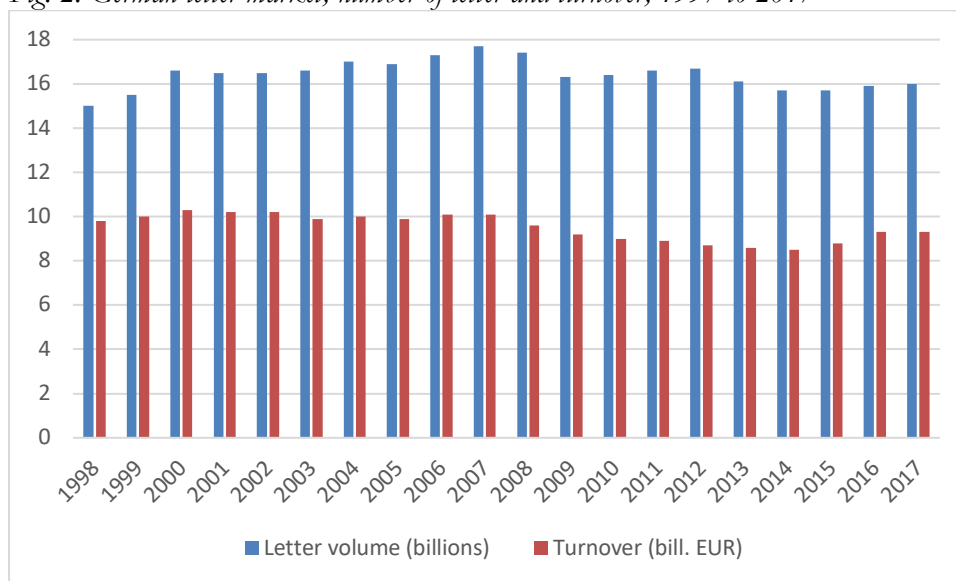
These types result in an overall picture of work politics, which is characterized by great differences in working conditions in terms of pay, working hours and work regulation.

The following sections outline the state of play of discussions in various sectors of the industry, namely letter and CEP services and logistics in industrial value chains.

3.3.1 German letter and CEP market

From a historical point of view, the German *letter market* was a growth market until 2007, and since then there has been a decline in the volume of letters. However, sales have stabilized again after a slight decline over the years and are even rising in 2014, as Figure 2 shows.

Fig. 2: German letter market, number of letter and turnover, 1997 to 2017



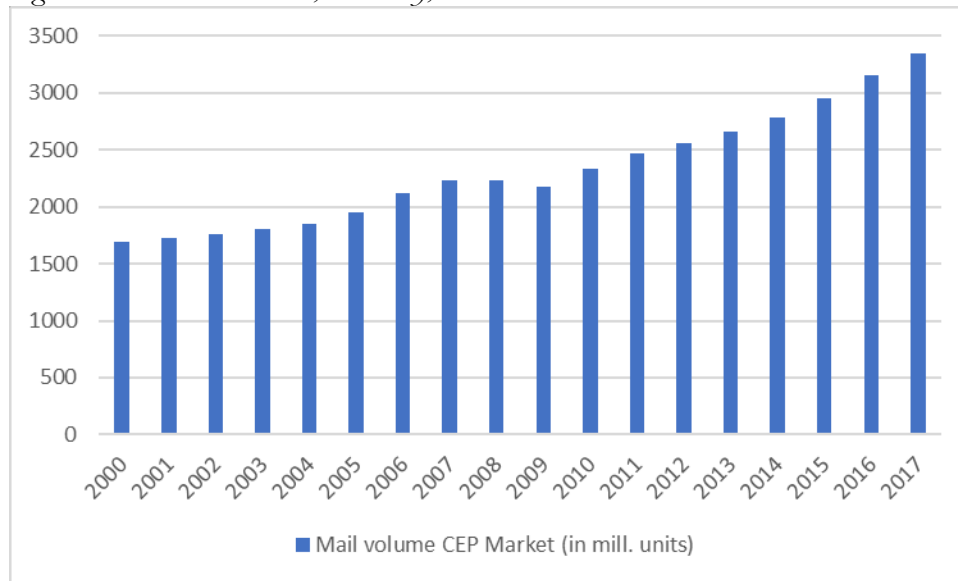
Source: Bundesnetzagentur (Federal Network Agency)

The competition on the German letter market is considered to be low (see Haucap 2018). The dominant company is Deutsche Post, which accounts for 83.5 percent of total revenue (2017, source: Bundesnetzagentur).

Digitalisation has two effects on the mail market. On the one hand, the rationalization of mailing by digital technologies and, on the other hand, the electronic substitution of letters by e-mail, SMS and other comparable forms of electronic communication. The latter poses a potential risk to the letter market, which depends on a specific volume due to its infrastructure and performance conditions. "Crucial is not the question of whether electronic substitutes can completely displace the mail, but whether the demand for letters will shrink so much that the provision of the postal service will not be able to provide the usual and expected quality, and whether in many countries too slow transition to electronic alternatives could potentially accelerate dramatically in a short period of time "(Riehm / Böhle 2014).

The central feature of the German *parcel market* is its strong focus on the five major companies that dominate the market and compete for price (Holst / Singe 2013: 46). The delivery activity is largely or completely outsourced, which results in a pronounced labor market segmentation (see above). In difference to the consolidated letter market, the market of the courier, express and parcel industry faces a clear growth (see fig. 3)

Fig. 3: CEP market volume, Germany, 2000 to 2017



Source: Bundesverband Paket und Expresslogistik BIEK

The CEP companies benefit in two ways from digitalisation. On the one hand, the growing internet-based business with end customers/consumer is the main driver for the growth of the industry. On the other hand, the technical efficiency of processes is being increased by digitization. An industry expert:

"The consignments are already being scanned and allocated by means of digital technologies at the depots, and digital sorting systems are increasingly being used in processing. Tour planning also benefits from digital technologies, through greater flexibility over shorter distances"(Int_1_Logistics).

Despite the constant progress of digitization in both the letter and the CEP market, there is no explicit discussion on the labor policy implications of digitization and / or the requirements, opportunities, risks of digitization for participation and social dialogue.

3.3.2 Logistics in industrial value chains

Growing complexity requirements in logistics in the industrial field mean that great hopes are placed in digitization strategies. The background is the so-called "complexity problem" of logistics in industrial value chains. It consists of two components, one being the increasing coordination complexity and the other the increasing scope of coordination. One main cause is the demand differentiation, i.e. an increasing demand for customized products (Westphal 2000) through a differentiation of customer wishes. This increases the complexity of product structures, from which higher coordination requirements can be derived. The number and

variety of endogenous and exogenous lot sizes increases, and at the same time the heterogeneity of the relationships between the lots increases (Wehberg 2016: 320).

Expert discussions about the future of logistics reveal great hopes that are being put into digitalisation, but the status of digitalisation is (still) in contrast to the problem described above: the available digital technologies are not up to the mark as they are make a decisive contribution to the solution of the problem outlined. Empirical studies have the result that "so far the objects do not communicate independently and have no direct influence on the flow of goods and processes in the companies. The 'Industry 4.0' version with autonomous control of logistics and production processes is still a long way away"(Windelbrand 2014: 151). This also applies, for example, to autonomous driving or autonomous vehicles, which although they occupy a large space in the public debate, are not yet technically advanced beyond experiments with prototypes (see Zanker 2018: 149).

The certified gap is not only a technological one, but also affects the interplay between technology and organization, according to Windelbrand: "As has been stated in the logistics study, for the most part neither the technological nor the organizational prerequisites for the 'Internet of Things' are given in companies" (ibid.: 154).

A central area of application of digital technologies in logistics is the location of means of transport through the combination of mobile technologies and Internet technologies with GPS or RFID. Another area is the "effectuation of logistical tasks and processes" by digital technologies through digital standardization and improved transport routes or warehouse management (Zanker 2018: 33).

3.3.3 Interim conclusion

Even though there is an intense debate about working conditions in the logistics industry, it is impossible to identify a more or less clearly defined discussion on digitalization, restructuring and co-determination in logistics for Germany. Regarding to the structure of labour, the decrease of simple work and, in part, of skilled work is seen as a probable impact of digitalisation in logistics. "Not only are manual activities such as the sorting of letter and parcel consignments or order picking in the warehouse industry affected, but also administrative and commercial tasks in freight forwarders" (Zanker 2018: 150). Where simple work remains, it is to be expected that the already limited scope for design will continue to decrease (Windelbrand 2014: 155ff, cf Kagermann et al., 2013). With regard to the future of the technical work, different scenarios are discussed that are roughly similar to those of

Ittermann et al. developed scenarios (see section 1). Hypothetical considerations make both processes of the de-qualification and the job enrichment seem conceivable, so that the skilled work in logistics largely eludes the prognosis possibility.

3.4 Manufacturing industries

The production of industrial goods is the economic sector, which is in the focus of the *Industrie 4.0*/Industry 4.0 concept. At the heart of this discussion are cyber-physical systems (CPS), therefore the combination of internet technologies with physical artifacts that established the concept of the Internet of Things. The concept is used in the factory, now "smart" production of goods: Industry 4.0 primarily means the digitization and networking of industrial value creation (Ittermann / Niehaus 2017). The emphasis on industry can also be drawn from the international debate, when a "second machine age" (Brynjolfsson / McAfee 2014) or, as in the German context, the "Third Industrial Revolution" (Rifkin 2011) are mentioned.

Just as in the field of (industry) logistics, the growing complexity of product markets, the individualization of products down to the quantity of one and the rationalization potential of CPS (Bauernhansl 2014) as part of the "dream of the deserted factory" (Holtgrewe et al. 2015), who was dreamed of in earlier times with the help of CIM (Computer Integrated Manufacturing) and whose realization expectations have risen again with techniques such as ERP, MES and finally DSS, despite legitimate critical counter-speech from the labour sociology.

The areas of application and effects of Industry 4.0 strategies are universal and affect all work areas and hierarchy levels of, for example, simple assembly work and the use of assistance systems there (Klippert et. al. 2018 # WSI, Kuhlmann et. al. 2018, Ulrich et. al.), or the impact of digital productive models on middle management in production (Francs / Francs 2017 in Hirsch-Kreinsen / Ittermann) in general or by strategies of the Digital Factory and Decision Support Systems (Mühge 2018).

The labor policy debate is also broad. An amalgamation takes place in the form of labor policy role models for the Industry 4.0. In view of the technology-centered and technical push-driven perspectives, mission statements should have an effect on the human-oriented structuring of technology and technology design (see Kuhlmann et al., 2018). Role modes have been developed e.g. in first contours by Hirsch-Kreinsen u.a. (2017; 2018) as well as -

in the trade union context - by Haipeter ("co-determination 4.0", 2018) as well as by Heyer / Reuter ("Decent Digital Work", Heyer / Reuter 2018). Their common characteristic is to emphasize the socio-technical character of the concept of Industry 4.0, which, even if it is often presented "without any alternative", does not differ in terms of the scope of design from other technical models: "There are alternatives and these do not depend on technology" (Holtgrewe et al. 2015: 42). Which development path is taken, whether re-Taylorism or a human-centered work design, for example, also depends on which guiding principles prevail on the various levels - operational, in an industry and on the level of society - and develop a shaping force. From the perspective of labor policy, the idea of the human-centered design of work has a high normative significance. This often means that the technical innovations must be counteracted by complementary innovations on the level of organization and work design, in order to be economically effective, but also to gain the necessary social acceptance. From the categories of the so-called socio-technical triangle ("man/work - machine/technology - organization") requirements for the design of interfaces are derived, for example, a collaborative perspective on the design of human-machine interfaces, to a work organization that enhances learning at the interface of between man and organization, etc. (Hirsch-Kreinsen et al. 2017: 384ff.).

Against the backdrop of the debate on the future and design options of industrial work, it is no coincidence that the first major trade union initiatives on digital work are located in the field of industry. These include the initiative *Arbeit und Innovation*, Work and Innovation (A + I) of the federal board of the metal workers union IG Metall, on the other hand the project *Arbeit 2020 in NRW*, Working 2020 in the state of North Rhine-Westphalia (NRW), a joint project under the leadership of the IG Metall NRW with the IG BCE (union for mining and the chemistry sector), the DGB NRW and the trade union for food, drinks and tobacco, NGG.

The aim of the project "Work and Innovation", more precisely: "Work and Innovation: Strengthening Competencies +> Shaping the Future" is to support works councils in designing and regulating work concerning to digitalisation in the interests of the employees (Schroth 2018). The IG Metall project is funded by the BMAS and has a duration from 2016 to 2019; about 120 companies participate. The project consists of three closely linked support services for works councils and other operational stakeholders.

- The first strand of action is a modularized training series for works councils, which are also open to selected employees and personnel managers from the companies; a special feature is that the employer can also send participants to the qualification program. The qualification objective is to enable the participants to "plan, steer, reflect and carry out the requisite operational change processes, with the involvement and participation of the workforce" (Schroth 2018). The basics of work organization and work design, technology design as well as process knowledge such as project management are taught. Part of the qualification is completed in the so called *Lern- und Forschungsfabrik*, Learning and Research Factory of the Ruhr-Universität Bochum, a facility in which work-oriented change processes can be carried out in real production process and used for didactic purposes.
- At the core of the A + I project are operational implementation projects carried out by works councils. These projects form the second strand of the project. The projects are thematically open; in practice, the design and regulation of work in digitization, as well as projects for qualification, working conditions, working time, are very important.
- The third strand of support consists of a network of experts, who can be called in by the works councils for unbureaucratic support and consulting regarding to their operational projects. The network includes about 30 scientific institutions, ranging from ergonomics to experts in production system design.

Overall, the ongoing A + I project has a central pilot function for the "conceptual development of trade union's company related policy", but it goes far beyond that: The project is an important field of testing for the future of employee participation and the development of appropriate, effective support structures for works councils, who are confronted with an increasing demand due to increasing technical and procedural requirements (see below) and gaining importance of the company level for regulating industrial relations.

The project "Working 2020 in NRW" (duration until the end of 2019) is a joint project of the proactive company policy promoted by the Ministry of Labor of North Rhine-Westphalia, in which 29 companies are involved. The project aims to introduce works councils to digitalisation at an early stage and to promote works councils in work structure design and regulatory tasks (Haipeter et al. 2018). This is done mainly through workshops with works councils, employees, but also with the participation of the management side. The central working method of the project is the so-called *Betriebslandkarte Industrie und Arbeit 4.0*

– “Company Map Industry and Work 4.0”. This map serves as an operational stocktaking tool for digitalisation and the clarification of the employers digitalisation strategy as well as related projects, work equipment and tools. The dimensions of the map are based on the concept of the "socio-technical triangle" (see above): man/work, organization, technology. Based on the inventory, according to the idea of the project, works councils are enabled to work with the employer to create digital working conditions, and, as has been achieved in six participating companies (ibid.: 225), to regulate it in the form of collective future arrangements.

Initial conclusions from the project are that industrial companies usually have "no coordinated and well-communicated digitalisation strategy", but often different digital "makeshift solutions" exist side by side (ibid.: 224). On the other hand, the lack of coordination is an opportunity for collective initiatives, which can contribute to clarification, reflection and systematization. In addition, the project shows that the regulation and design of digitalisation strategies faces higher hurdles on both employer and works council sides.

4 Conclusion section

The brief analyzes on the state of digitalization, labor policy and social dialogue in the four selected sectors initially show that there are large sectoral differences in the production models and that there is a heterogeneous picture of the state of affairs, the scenarios and labor-policy problems of digitization.

In order to summarize and to condense the results, it appears to be sensible to juxtapose the respective effects of digital business models in the sectors in order to clarify differences in the labor policy requirements for a human-centered work design and at the same time to identify organizational needs and problems of co-determination and social dialogue. From the introduction and industry reports, the following possible effects of digital technologies can be deduced:

- Automation, rationalization of tasks
- Support and assistance through human-machine interaction
- Work control, performance and behavior control
- Objectification of decisions, digitization of coordinating tasks
- Marketization
- Erosion of boundaries: flexibilisation of working contracts, hours, and places

Table 2: Sector specific impact of digitalization on labour

	Tourism	Financial Sector	Postal services / Logistics	Industry Sector
Automation, rationalisation of tasks	O	+++	++	+
Assistance and support	O	++	+++	+
Work-, performance control	O	++	++	++
Objectivation of decisions	O	++	O	+
Marketization	+++	++	O	O
Erosion of firm's boundaries	++	+	O	+
State of digitalisation	Low in work structure, high concerning platform models	Very advanced	Advanced in the upper segment, low-advanced in SMEs	High variability from well- to low-advanced
Dominant scenario	No digital change yet	Automatisation	No clear prognosis possible, Polarization?	No dominant type, mixture of types
Opportunities of human-centered digital labour structure and social dialogue	Not necessary	low	Depending on the segment	Depending on effective support structures

Macroeconomic change and co-determination are not only closely connected since digitalisation. Both the tasks of co-determination and its framework conditions were in the past and are still subject to constant change. Central developments are the gaining importance of collective agreements on company level and the loss of importance of collective bargaining agreements (Schnabel 2005) and, associated with this, the weakening tendency (even if currently decreasing) among trade unions (Müller-Jentsch / Ittermann 2000). Overall, an increase in the importance of employee participation is observed, however, the development is judged to be double-edged: on the one hand the requirements and regulatory demands are growing, on the other hand resources are not expanded or certain negotiating options of participation become more important (Eberling et al. 2004). The demands on works councils lead to a tension between competence gain and over-demand risk; solutions are seen in the professionalisation of works councils as well as the (further) development of adequate forms of support (Nettelstroth et al., 2010).

It is the unanimous opinion of interviewees and experts that digitalisation is exacerbating the overload of workers councils. They lack not only "digital expert knowledge", but also process and method knowledge, for example on topics such as project management, leadership and negotiation skills.

"Working methods such as Agile Project Management or Scrum cannot solve the [works council] issues, but they can help works councils to reflect and perhaps improve their work processes" (Int_3_Industry)

The structure of the IG Metall project A + I in particular (see sector analysis) addresses precisely these problems; whether it effectively supports works councils is still an open question that should be further explored in DIRESOC. But, it is certain that digitalisation holds a great opportunity for trade unions, not only in terms of manufacturing but also in in the service sector. "The central place of trade union action is and remains the company" (Schroth 2018).

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