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## Editorial: Job quality in digitalized work environments

### Developments, potentials, and challenges

**Abstract:** Given the rapid digitalization of the world of work, this editorial discusses possible relations to job quality and shows which factors of job quality have been given priority so far. Further, it places the contributions to the special issue in the discourse of digitalization and suggests further research. We argue that digitalization does not affect all groups of employees equally and that it can have varying consequences in different (work) contexts. We are pleased about the increasing attention paid to this topic in empirical social research. The multifaceted contributions to the special issue confirm that digitalization is not a fixed construct and that it contains many different facets. Therefore, we encourage researchers to expand the empirical analysis of the relationship between digitalization and quality of work and employment in the future, to transfer studies (if possible) into the longitudinal section, to study new phenomena, and to classify them in the discourse, as well as to consider possible moderators in the future.

**Keywords:** Digitalization; Technological Change; Work 4.0; Job Quality; Quality of Work; Quality of Employment; Empirical Social Research

## Editorial: Arbeitsqualität in digitalisierten Arbeitswelten

### Entwicklungen, Potenziale und Herausforderungen

**Zusammenfassung:** Angesichts der rapiden Digitalisierung der Arbeitswelt diskutiert das vorliegende Editorial mögliche Zusammenhänge mit Arbeits- und Beschäftigtenqualität und zeigt auf, welche Faktoren der Arbeits- und Beschäftigtenqualität bislang vorrangig betrachtet wurden. Zudem ordnet es die Beiträge des Sonderheftes in den Diskurs ein und gibt Hinweise auf mögliche weitere Forschungsfragen. Dabei vertreten wir die Position, dass Digitalisierung nicht alle Beschäftigtengruppen gleichermaßen trifft und auch in verschiedenen (Arbeits-)Kontexten mit unterschiedlichen Folgen einhergehen kann. Wir freuen uns über die zunehmende Aufmerksamkeit, die dem Themenfeld in der empirischen Sozialforschung entgegen-

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gebracht wird. Einmal mehr zeigen die Beiträge des Sonderhefts, dass die Digitalisierung kein feststehendes Konstrukt darstellt und viele unterschiedliche Facetten beinhaltet. Deshalb plädieren wir mit unserem Beitrag dafür, die empirische Analyse des Zusammenhangs zwischen der Digitalisierung und Arbeits- sowie Beschäftigungsqualität auch zukünftig auszubauen, Studien sofern möglich in den Längsschnitt zu überführen, neue Phänomene zu erfassen und in den Diskurs einzuordnen sowie mögliche Moderatoren stärker zu berücksichtigen.

**Stichworte:** Digitalisierung; technologischer Wandel; Arbeit 4.0; Jobqualität; Arbeitsqualität; Beschäftigungsqualität; empirische Sozialforschung

## 1 Introduction

Many companies have increased their investments in digital technologies during the COVID-19 pandemic and many experts see the crisis as an accelerator of digitalization in German work organizations (Bellmann et al. 2021). All over the world, the pandemic has pushed investments in networking and remote work possibilities and has led to sustainable changes in the organization of work. Apart from the recent relevance, digitalization was already held responsible for many ongoing changes and developments in the world of work. Thereby, the possibility of wide-ranging and radical changes in relation to technological developments is not unique to the 21<sup>st</sup> century, but known from previous industrial revolutions (Autor 2015). In this context, digitalization is often framed as the fourth industrial revolution (Hirsch-Kreinsen 2016). However, the speed of technological advancements and the level of innovation of technologies, such as the use of complex algorithms and artificial intelligence, are often discussed as more fundamentally transforming the labor market and the way we work.

A prominent and important literature stream focuses on overall employment effects. Based on the idea of automation and consequently the substitution of jobs, scholars aim to explain potential job losses by occupation-based technological change (Frey/Osborne 2013), or task-based technological change (Dengler/Matthes 2018). Nonetheless, researchers seem to largely agree that human labor, in one way or the other, will remain an important aspect of our lives in the future (Brynjolfsson/Mitchell 2017). However, there is less consensus on how specific working and living contexts may change, how those changes can be explained, and how fast they may occur. In addition, empirical evidence on the impact of digitalized work environments on work and job quality can still be considered scarce. The question of how digitalization has the potential to change the quality of work in the long term has led us to organize the present special issue of *Soziale Welt*.

Within this special issue, we aim to focus on the ongoing digitalization of work and possible developments in and challenges for job quality. There are several reasons why job quality is of particular interest in the context of digitalized work environ-

ments: First and foremost, digitalization has the potential to fundamentally change the way we work. Different indicators of job quality have been proven to be important predictors of individual health and well-being as set out in job demand-resources models (Bakker/Demerouti 2007). Furthermore, a systematic review reveals evidence for a negative relationship between job strain and individual at-work productivity (Arends et al. 2017). Research on job quality has a long research tradition. Thus, changes in relation to digitalized work environments can be evaluated against the background of previous knowledge on the mechanisms regarding job quality. Moreover, further research seems necessary to put technological hypes in long-term perspective on the process of digitalization and to embed the discourse in other discourses on the developments in job quality. Finally, we still observe a lack of empirical research on the impacts of digitalization – mostly because many scholars have been in the process of data collection throughout the last years, and adequate data to analyze (causal) effects of digitalized work on job quality must still be considered rare.

Therefore, we aim to give an introduction to the variety of the digitalization debate regarding job quality. In doing so, we do not claim to be exhaustive, but aim to provide an overview of different levels of diversity in the discussion.

## 2 Empirical approaches to the analysis of digitalization

The digitalization of the world of work has gained attention during the last decades. Accordingly, the number of scientific contributions has been increasing remarkably and continuously since about 2005: A SSCI search on the keyword “digitalization” reveals that in 2008, a two-figure number of articles was published for the first time. A three-digit number was first published in 2017, ranging up to 693 results in 2020. Similarly, regarding the combined keywords “digital” and “work”, a significant jump can be identified in 2015 with over 1,000 articles for the first time in 2016, and already 3,684 indexed publications in 2020.

However, despite the increasing number of publications, so far there is no shared definition or conceptualization of the term *digitalization*. Most basically, digitalization refers to the increasing distribution and use of digital technologies (Govers/van Amelsvoort 2019). With regard to job quality, digital technologies, but also different functions of digital tools, or consequences of the distribution of digital technologies, have been under study.

Earlier studies are characterized by vague predictions of possible future scenarios. They rarely operationalize their concepts to actually measure their predictions. However, empirical approaches became more and more important in the study of digitalized work environments. One category of empirical approaches has been established in the context of the occupation-based (Frey/Osborne 2013) and task-based (Dengler/Matthes 2018) technological change hypotheses. In this case, information on existing occupations and tasks are used and complemented by expert opinions or

the evaluation of current technological possibilities, to analyze and predict potentials for automation and, eventually, substitution of specific tasks or occupations. A common critique of those approaches is that they do not explicitly measure how these substitution potentials come true. However, the substitution potentials have already been useful to analyze different aspects of job quality, such as physical and psychosocial work demands (Dengler/Tisch 2020), or subjective job insecurity (Dengler/Gundert 2021). Using occupation-specific substitution potentials as a measure for digitalization, Müller, Stawarz, and Wicht (within this special issue) investigate the association of digitalization and job insecurity and ask whether different groups of employees experience different levels of job insecurity in the digital transformation.

Another part of existing empirical studies is based on large-scale representative employee surveys. In recent years, an increasing number of employee surveys have implemented (additional) modules to measure digitalized work environments. Early studies used very broad measures of digitalization, such as work-related computer or internet usage, for instance in the German sub-study of the European Social Survey, 2017 (ESS Round 8: European Social Survey Round 8 Data 2018), SOEP, 2017 (Liebig et al. 2019), or BIBB-BAuA, 2012/2018 (Hall et al. 2020). Based on these studies, it was possible to gain initial insights into the general relationship between digitalization and job quality (e.g., Kirchner 2015; Meyer et al. 2019). However, these survey studies suffered from the ability to picture more recent developments and to mirror more complex aspects of digitalized work. Therefore, large employee surveys started to include more sophisticated measures of digitalization. Some of these attempts are covered by articles within this special issue. Friedrich, Laible, Pollak, Schongen, Schulz, and Vicari provide detailed information on a new, multi-dimensional survey module on digitalization, which has recently been implemented in the adult cohort study of the *German National Educational Panel Study* (NEPS). Furthermore, Giering and Kirchner show analyses based on the *Innovation Sample of the Socio-Economic Panel* (SOEP-IS 2019). The analyses of Gensler and Abendroth are based on a comprehensive module on digitalization implemented in the *Linked Employer-Employee Panel B3* (LEEP-B3, Reimann et al. 2020), a survey study of employees in large companies. Finally, Meyer and Hünefeld rely on data from the *Digitization and Change in Employment study* (DiWaBe), a survey study established to analyze different aspects of digitalization and their association with different works aspects, such as different indicators for job quality. Therefore, this special issue provides insights on the relationship between digitalization and job quality, but also gives an overview of the most recent data on the digitalization of work.

Before questions to operationalize digitalized work environments were implemented in large-scale representative survey studies, empirical research on digitalization was dominated by case and laboratory studies, including both qualitative and quantitative approaches. These studies often focus on specific technologies (e.g., robots,

Barth et al. 2020; or smart glasses, e.g., Holz et al. 2021), or selected occupations and industries (e.g., Buss et al. 2021), and offer detailed insights on how different aspects of digitalization change the world of work. The comparably high number of case and laboratory studies reflect a huge need for in-depth analyses to explore the unknown relation between digitalized work and job quality as well as underlying mechanisms. Furthermore, company case studies allow studying the institutional context of digitalized work in more detail. Correspondingly, Schneider, Ganesch, Schmierl, and Struck (within this special issue) analyze how specific digital technologies influence work processes, considering the design of technologies, but also organizational embedding and companies' underlying policies.

Finally, the digitalization of work opens possibilities for new, technology-supported ways of data collection to analyze job quality. Wearables that measure stress levels are probably the most advanced data collection methods but are still rarely used in social sciences (e.g., Muaremi et al. 2013; Han et al. 2017). In addition, there are different technological opportunities for collecting large amounts of data on the digital behavior of employees by using algorithms or tracking tools. Consequently, it is the beginning of a debate on how to analyze such new types of data, but also on the ethical justification of data collection, as well as on new issues for privacy protection (Lazer/Radford 2017; Weinhardt 2021). Still, for the present special issue, we did not receive any contribution relying on data other than interviews or questionnaires.

### 3 Digitalization as a challenge for job quality

Job quality is widely used as a generic term for different aspects of “work and employment quality” (Achatz/Gundert 2017; Hauff/Kirchner 2014; Muñoz de Bustillo et al. 2009; 2011). The scholarly discourse largely agrees that job quality is a multidimensional concept. Literature on digitalized work in relation to job quality was first enhanced by the Industry 4.0 debate in Germany. In the beginning, the discussion on the digitalization of work was characterized by forecasting and conceptual literature. The industry 4.0 debate in Germany is a well-known example that originated in a discussion on how the industrial revolution could look like rather than representing a theory-based or even empirical analysis (Hirsch-Kreinsen 2014). Since the introduction of the term in 2011, it was continuously spread across experts and the scientific community, but also in public media, increasing international visibility, and even a leading role was attributed to Germany (Hirsch-Kreinsen 2014). At the heart of the industry 4.0 debate lays the assessment of technological change, but also the attempt to actively shape working conditions for workers, hence, to improve job quality. The basic idea of industry 4.0 is that the interconnectivity of different physical objects via computer networks enables production processes to operate highly autonomously (Bauernhansl 2014; Hirsch-Kreinsen 2014).

While these studies primarily look at digitalization in production, another strand of research focuses on the increasing spread of computer work or the use of information and communication technologies (ICT), and possible consequences for employees. Although the use of computers was found to improve the quality of work, permanent computer use was associated with an increase in physical and mental strain (Andries et al. 2002). Furthermore, e.g., Carstensen (2015) argues that the increasing dissemination of internet and social media, mobile phones, smartphones, laptops, and tablets may be a threat to job quality, and does not only trigger ergonomic deficits, but also enhances boundaryless work and precarisation of work.

Within the discourse on job quality, a variety of indicators can be identified: income and social security, employment security, learning and development opportunities, autonomy, adequate work intensity, social support at the workplace, and working hours that allow for a better work-life balance (c.f., Achatz/Gundert 2017). In the context of digitalization, however, some aspects are considered to be under threat. Accordingly, it is assumed that increasing automation and substitutability of work-related tasks and occupations will reduce *employment security* among at least some groups of employees (Dengler/Matthes 2018; Frey/Osborne 2013). Indeed, current studies point to increased cognitive job insecurity (Dengler/Gundert 2021) in the course of digitalization as well as feelings of job insecurity among particular groups of workers (Eurofound 2021). Within this special issue, Müller, Stawarz, and Wicht analyze the relationship between potential automation and job insecurity among different socio-economic groups.

Moreover, *learning and development opportunities* are considered to be indicators of job quality that can be threatened by digitalization. A most recent study indicates that in Europe, no common trend can be observed regarding deskilling, upskilling or polarization of jobs in the era of digitalization (Martinaitis et al. 2021). However, there is an ongoing and lively debate on how digitalization alters job skill demands (Autor et al. 2003; Braverman 1974; Fraser 2010; Green et al. 2016), and although it is most commonly agreed that further training is increasingly important in the course of digitalization, it remains unclear which specific skills gain in importance and to which particular labor market group it applies. Against this background, Friedrich, Laible, Pollak, Schongen, Schulz & Vicari (within this special issue) analyze the need for further training among different socio-demographic groups. Furthermore, Schneider, Ganesch, Schmierl & Struck (within this special issue) discuss deskilling trends in transport logistics.

With regard to work quality, a variety of studies suggest an association between digitalization and *work intensity* (Borle et al. 2021; Meyer et al. 2019; Pfeiffer 2012). In particular, an increase in the use of ICT seems to drive multitasking, faster-paced work, greater levels of interruptions, as well as boundaryless work (Borle et al. 2021; Chesley 2014). Within the model of technostress, different indicators

of work intensification, such as information overload, techno-complexity, or techno-unreliability, are considered as causalities for health effects of ICT use (Tarafdar et al. 2015). Furthermore, Kirchner (2015) points to differences in the associations with work intensity depending on the specific technology and its functions. However, little is known about the underlying mechanisms that might explain how the use of technical equipment or rather the associated changes in the organization of work may lead to work intensification within the scope of the digital transformation. In this context, Meyer & Hünefeld (in this special issue) find the extent of the mobility of the technology to be crucial for the relationship between digitalized work and work intensification.

Finally, an increasing literature stream discusses potential decreases in *work autonomy* in the course of digitalization and automation. First studies examine the extent to which, and for whom, increasing digitalization leads to digital Taylorism, or rather to digital self-determination (Jaehrling 2019; Kirchner et al. 2020). This debate becomes even more important against the background of an increasing spread of algorithmic management and artificial intelligence. Within this special issue, Gensler and Abendroth as well as Giering and Kirchner are among the first to investigate the relationship between algorithmic management and the use of artificial intelligence and job autonomy for Germany.

#### 4 Conclusion and further research opportunities

Overall, the contributions to this special issue show that a large number of different aspects of digitalized work environments can influence many important aspects of job quality. The collection of diverse empirical studies shows that there seems to be hardly any clear one-dimensional relationship between digitalization and job quality. Rather, digitalized work environments seem to have different effects on work quality for different groups of employees, and in different work settings and contexts. Already known social inequalities appear to be reproduced in the course of digitalization. In addition, new challenges, also for formerly rather privileged employees, emerge.

The special issue provides further insights into the association between digitalization and indicators of job quality that are predominantly discussed in the current debate: job insecurity, skill demands, work intensity, and work autonomy. Further research could focus on so far less considered aspects. An example of a rather less considered aspect is the relationship between digitalization and social support. Particularly when digital collaboration will be expanding even further after the COVID-19 pandemic, it has to be questioned how digital technologies can be used but social cohesion enhanced at the same time (Trier/Richter 2015; Wang et al. 2020).

Closely related to this aspect is the debate about the increasing dissolution of boundaries between work and private life, that is, when work tasks can increasingly be

performed regardless of time and location due to digitalized work environments (Arnold et al. 2015; Grunau et al. 2019). Finally, technostress theories hint at further possible aspects of digitalization that may influence individual job quality. In particular, techno-unreliability as well as technological workplace surveillance have received less attention until now (Dragano et al. 2021).

Moreover, the collection of empirical studies included in this special issue – covering different aspects of job quality in relation to very different measurements of digitalized work environments, and among diverse labor market groups – shows that quantitative and qualitative empirical studies are reliant on comprehensive as well as specific databases. Since digitalization has been found to be multi-dimensional and no standardized measurement is available, we encourage scholars to further invest in the development and implementation of approaches to measure digitalization in large-scale surveys as well as in the case or laboratory studies.

Although (organizational) context is considered in some of the articles within this special issue, it seems important that further research on the relationship between digitalized work environments and job quality provides insights not only on digitalization, hence the dissemination and use of different technologies, but also on the way new technologies are implemented in workplaces, and how the implementation changes work processes and work organization. It can be assumed that the use of different technologies, but also new forms of work collaboration (triggered by digitalization) as well as new challenges and skill demands influence how work quality is perceived by employees. The implementation of new technologies and the effects of the use of different technologies can best be analyzed with longitudinal data. However, currently, many studies can only rely on cross-sectional data. We therefore encourage the many different approaches to measure digitalized work environments to be surveyed again in additional panel survey rounds to further follow developments in the context of digitalization.

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