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THE FUTURE OF LOW-SKILLED INDUSTRIAL WORK

AT A GLANCE

In the discussions over Industry 4.0 and digitalisation of manufacturing, it is often suggested that low-skilled work is a thing of the past. In fact, there is little evidence of a general erosion of low-skilled industrial work. Instead, this sector of the labour market is characterised by processes of change. Four development paths are identified: loss of low-skilled work through automation; upgrading of low-skilled work; new forms of digital low-skilled work; and structurally conservative preservation of existing patterns of low-skilled work.

In the debate over the consequences of digital technologies there is a virtual consensus that simple, routine tasks are especially threatened by the new technologies, and will largely disappear in the longer term. These arguments resurface strongly in the German debate over Industry 4.0, where it is widely asserted that jobs for low-skilled workers will disappear entirely from German manufacturing within just a few decades. The social consequences of this trend, it is feared, will be a significant loss of employment in the low-skilled sector and rising unemployment among increasingly marginalised low-skilled groups, resulting in further growth in income inequality. Ultimately, it is claimed, these developments will threaten social integration, stability and economic development as a whole.[1] If this scenario comes to pass, it will obviously face state social and labour market policy with enormous challenges.

LOW-SKILLED INDUSTRIAL WORK

What are the consequences of Industry 4.0 for the future of low-skilled work in the industrial sector? Answers can be found in a recent empirical study by Jörg Abel, Hartmut Hirsch-Kreinsen and Peter Ittermann on the structures, dissemination and perspectives of low-skilled work in industry.[2] Low-skilled work requires no particular vocational qualification, and can be carried out after relatively brief training or familiarisation processes. It is generally tied to a specific job or area; broader expertise and background knowledge are less important or completely unnecessary. Typical low-skilled activities in industry include manual operation of specialised machine tools, short-cycle machine feeding, repetitive packaging tasks, monotonous monitoring tasks, and very many warehousing and commissioning functions in logistics. One central finding of the study is that low-skilled work still represents a surprisingly high proportion of employment in manufacturing industry in Germany; according to the IAB-Betriebspanel data for 2013, about 23 percent of the labour force possess no vocational qualifications. The core areas for low-skilled industrial work are manufacture of rubber and plastic products, the food, beverages and tobacco sector, and metalworking, but it is also found in more skill-intensive branches such as mechanical engineering, chemicals and vehicle construction. The proportions of low-skilled work are highest in small and medium-sized enterprises.

EXTENSIVE SUBSTITUTION OF LOW-SKILLED WORK?

The widespread belief that low-skilled industrial work is on the way out is based on two different arguments:[3]

– On the one hand, it is argued that the structured and routine character of these activities makes them relatively easy to algorithmise, computerise and automate. From this perspective, low-skilled work will be increasingly substituted by digital technologies.

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– On the other hand, it is emphasised that the new technologies and growing technological complexity of work processes will create new demanding tasks and skill requirements. Rather than simply disappearing, low-skilled industrial work will undergo a continuous upskilling process.

Henning Kagermann, one of the prominent voices of the Industry 4.0 vision in Germany, puts it in a nutshell: In the future workers will be employed less as "machine operators" and more "in the role of the experienced expert, decision-maker and coordinator … and the individual's work becomes more diverse".[4]

In fact, it is almost impossible to predict social effects solely on the basis of the potential of new technologies. Industrial and technological sociology has produced a wealth of conceptual and empirical findings demonstrating that the development and diffusion of new technologies is anything but a smooth and uncontradictory process, and that it is therefore almost impossible to predict social effects solely on the basis of the potential of new technologies. Instead, a complex relationship between the implementation of technical systems and the impact on work is influenced by a multitude of additional factors. Three principal factors emerge with respect to the consequences of digitalisation: firstly, limits to automation set by the great importance of uncomputerisable experience, secondly, the dynamic pace of change in tasks and work processes; and thirdly the influence of widely varying enterprise structures.

DEVELOPMENT PATHS FOR LOW-SKILLED INDUSTRIAL WORK

So if it is the case that low-skilled industrial work is not simply going to disappear, what is its future? While the present evidence is too thin to supply definitive answers, initial research permits us to distinguish four development paths:[5]

(1) The first development path can be characterised as "automation of low-skilled industrial work", with broad introduction of digital technologies to automate work processes. The consequence is an extensive substitution of low-skilled work in production and logistics, as very widely predicted. This development comprises a very broad spectrum of different branches and workplaces, ranging from SMEs through to major corporations with extensive R&D. The characteristic they all share is the manufacture of standardised products and the strategic objective of significantly increasing both the productivity and the flexibility of their production through application of the new technologies. These enterprises apply digital technologies in a wide range of functions, most of all directly in production processes. This affects simple activities characterised by a strongly routine nature, limited complexity, low requirement of experience and sometimes a high level of stress. In the car industry simple tasks such as assembly, welding and bodyshop tend to be substituted. In the metal industry, especially for example forging, the introduction of robots replaces certain extremely unpleasant jobs, and in the logistics sector the application of smart systems can often replace packaging, commissioning and simple control tasks.

(2) The second development path can be characterised as "upgrading of low-skilled industrial work". It is often found in SMEs with a high proportion of low-skilled work, limited resources and historically low adoption of process technologies. Although technologically standardised products are also produced in this context, the managements of these enterprises pursue a strategy of technological product improvement paired with a highly flexible marketing orientation. Examples are found among automotive suppliers seeking to move up the supply pyramid by upgrading their technologies. Typical new process technologies here are, for example, intelligent robot systems, assistance systems and new, optimised process control systems. These have multiple impacts on existing low-skilled jobs: Firstly, the level of process automation increases and the work becomes functionally and temporally separated from the technological process. This decoupling can be exploited for job enrichment measures. Secondly, the scope and extent of available process data and information increases, permitting staff to gain valid and reliable information and a broader overview of the process as a whole. Thirdly, adaptive learning assistance systems can be used for targeted on-the-job training. Under these conditions the traditional work organisation and division of labour and the existing dominance of low-skilled work undergo great change – opening up previously unknown possibilities for creating flexible and upskilled forms of work.

(3) The third development path can be characterised as "digitalised low-skilled work". It comprises a broad spectrum of different types of enterprise and process, ranging from digitalised intra-enterprise processes through to extensive inter-enterprise networking. The involved enterprises may be large or medium-sized, and in particular very small firms in a wide range of sectors. The intra- and inter-enterprise work processes involved here demonstrate a high intensity of application of digital technologies. Examples include the use of networked intelligent plant and robots in formerly largely manual work processes such as assembly and packaging, and the use of information and assistance systems to optimise information flows and improve the control of work processes for example in logistics. The possibilities of the information and coordination systems (internet platforms) that control the inter-enterprise processes of crowdsourcing and crowdworking also play a role here. The new and very different forms of digitalised low-skilled work emerging in this context can be categorised as follows:

– Firstly, there is a restructuring of existing low-skilled tasks and activities, for example through the use of assistance systems leading to continuous optimisation of the activities in question.

– Secondly, a simplification of hitherto relatively skilled activities through computerised modelling and formali-

sation is observed. This leads to tendencies for deskilling, reduced freedom of action and expanded possibilities of external control over these new activities.

– Thirdly, new forms of low-skilled work arise as "residual functions" or "automation gaps" in the context of far-reaching digital automation of work processes, for example in monitoring, feeding and data handling.

– Finally, new forms of inter-enterprise low-skilled work may also arise in the context of crowdworking, where originally complex activities, for example in R&D or marketing, are digitally simplified and outsourced.

(4) The fourth development path can be characterised as "structurally conservative stabilisation of low-skilled work", where there is no discernible change in existing employment and organisational structures. This situation is mostly found in SMEs with low R&D intensity and limited application of process technologies, producing technologically mature and standardised products. Structurally these are typically SMEs in traditional manufacturing industry such as metal-working and plastics, wood and furniture, or food processing. They have restricted financial resources and limited technological expertise. These enterprises succeed in achieving adequate efficiency in their traditionally structured work processes on the basis of a low level of digitalisation. The mode of work organisation characterised as classical Taylorism predominates in these cases.[6] This structural conservatism is often accompanied by strong scepticism among decisive management representatives towards the promises of the Industry 4.0 concept.

POLITICAL CONFLICT OF GOALS

These different development paths create a fundamental conflict of goals for policy action:

– On the one hand, promoting the development of "good" low-skilled work is an obvious modernisation and employment objective. This means measures directed towards the automation of unhealthy and dangerous tasks and the upgrading of low-skilled work through targeted qualification and upskilling measures.

– On the other, social and labour-market needs would imply stabilising low-skilled work (normatively "bad" work) in order to preserve and potentially create employment opportunities for a growing number of low-skilled workers.

What is generally needed, therefore, is an innovation and employment policy to address that conflict of goals through differentiated measures. Above all, the high-tech-driven policy pursued to date needs to be expanded, with greater attention devoted to low-skilled work in less technology-intensive branches and workplaces.

About the author

Hartmut Hirsch-Kreinsen taught economic and industrial sociology at TU Dortmund until 2015.

On this Publication

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Notes

1 – R. Collins: The End of Middle Class Work: No More Escapes, in: I. Wallerstein; R Collins; G. Derlugian; C. Calhoun (eds.): Does Capitalism Have a Future? Oxford and New York 2013, pp. 37–70; C. Crouch: Wir brauchen einen neuen Sozialvertrag: Die neuen Technologien bedrohen vor allem Arbeitnehmer mit geringen Qualifikationen, Handelsblatt, 30 April 2015.
2 – J. Abel; H. Hirsch-Kreinsen; P. Ittermann: Einfacharbeit in der Industrie: Strukturen, Verbreitung und Perspektiven, Berlin 2014.
3 – T. Bauernhansl: Die Vierte Industrielle Revolution – Der Weg in ein wertschaffendes Produktionsparadigma, in: T. Bauernhansl; M. ten Hompel; B. Vogel-Heuser (eds.): Industrie 4.0 in Produktion, Automatisierung und Logistik: Anwendung, Technologien, Migration, Wiesbaden 2014, pp. 5–36.
4 – H. Kagermann: Chancen von Industrie 4.0 nutzen, in: T. Bauernhansl; M. ten Hompel; B. Vogel-Heuser (eds.): Industrie 4.0 in Produktion, Automatisierung und Logistik: Anwendung, Technologien, Migration, Wiesbaden 2014, pp. 604–13, p. 608.
5 – Methodologically speaking these are scenarios, in the sense of a general description of possible future trends. They are based on a consistent combination of projections with the central influencing factors discussed in the literature. These scenarios (development paths) are naturally hypothetical in nature and await empirical validation.
6 – Abel et al., op cit., pp. 138.

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