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EXPLORATION INTO QUALIFICATION TRANFORMATION OF EMPLOYEES WORKING WITH DECISION-SUPPORT-SYSTEMS

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ABSTRACT

The introduction of new information and communication technology (ICT) in the company is often associated with the need for new qualifications and skills as well as different fields of activity and responsibility for the employees. Studies have shown a skill-biased digital divide in certain fields of ICT. In this study, trend scenarios of qualification requirements of workers using decision-support-systems (DSS) were evaluated in four different sectors: civil protection, energy management, plant maintenance, hospital- and operating room management. The results show either an increase in complex tasks or a shift to distinctively different areas of activity for workers affected by the use of DSS, especially in cases where management decisions lead to the reorganization of workers.

KEYWORDS

Qualification requirements; decision-support-systems; human-machine-interaction

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1 INTRODUCTION

Evidence from scientific studies has shown that with the implementation of new information- and communication technology (ICT) in companies and institutions areas of activity and responsibility of employees can change and consequently transform qualification requirements (Hecklau et al. 2016; Dengler and Matthes 2015). Consequently, this research aimed to investigate this proposition by exploring possible qualification changes of workers as a result of the use of decision-support-systems (DSS) as an example of ICT, and additionally evaluate possible developmental perspectives for qualifications of these workers. DSS exploiting Big Data offer companies and institutions profitable opportunities by linking already existing and new information pools to optimize and accelerate processes and, as a result, achieve greater efficiency-gains in the quality or quantity of their output (Jelinek and Bergey 2013).

2 METHODOLOGY

The study was conducted as a set of qualitative interviews using standardized questionnaires with experts from four different sectors: civil protection, energy management, plant maintenance, hospital- and operating room management, that were selected due to their involvement in different research projects aiming to develop innovative DSS exploiting Big Data.[1] The in total five interviewees were either using the DSS themselves or supervising workers using the system and thus had been the first users. As the projects were still ongoing at the time of the interviews, the DSS were in their developing-state and being tested. Although, the data sources, design-process and interface of each project-DSS differed, the projects all aimed to develop platforms designed for the workers who initially handled the data analysis up to then (often manually). Key research questions examined in the study were: (A) How are qualification requirements of workers changing as DSS are used? (B) How will the allocation of complex activities between the workforce and the DSS develop prospectively? Qualification requirements were classified into four categories according to the catalogue of the Federal Employment Agency (Bundesagentur für Arbeit 2010). To get closer to the first research question, an assumption from Social and Economic Science was taken into account: the digitalization of work leads to skills-biased effects on the labor market (Fernández-Macías and Hurley 2017; Sparreboom and Tarvid 2016). Researchers observed two prominent phenomena concerning the development of qualification requirements that will be evaluated in this study: Upgrading and Polarization of qualifications (Hirsch-Kreinsen 2016). Upgrading is the revaluation of work that accompanies either an all-encompassing increase in the qualifications of all workers or a devaluation of the low-skilled (Huchler 2016). Polarization describes an opposing divide of qualification requirements: an increasing relevance of low-skilled and highly-qualified and a decreasing importance of medium-skilled workers (Goos, Manning, and Salomons 2014).
For the second question, a closer look was taken at recent research concerning human-machine-interaction, finding two possible trend scenarios of human-machine-interaction: tool scenario and automation-scenario (Dworschak and Zaiser 2014; Windelband and Spöttl 2012). In my study, the two scenarios were evaluated for its application in the context of DSS and its impact on qualification requirements of workers. In the first scenario, the deployed technology is used to rapidly process information necessary for the workers to make and support decisions. In the automation-scenario, the DSS provides either workers with precast decisions concerning steps within a process based on its analyzed data

[1] Further information about the projects can be found via: www.smart-data-programm.de

set or executes the necessary tasks itself. Workers perform more assistive activities and inspect the quality of the DSS outcome.(Windelband 2014) The experts were introduced to the scenarios and compared them with the current state of affair concerning the human-DSS-interaction within their institution.

3 RESULTS

In two of the four cases, energy management and plant maintenance, the DSS was used to conduct analytical processes autonomously and based on that automatize decisions and activities. The management decided to split the affected workers into two groups: the first group was now appointed to watch over the deployed system in order to inspect the quality of its outcome and manage to alter the system or intervene in its working. The group needed to focus on the complex not automatized processes and activities. The other group was now occupied with less analytical and complex work involving the communication of the DSS' outcome and its implications with colleagues and business partners. In contrast, in the other two cases, civil protection and hospital- and operation room management, the DSS was solemnly used as an information tool. Information that would have formerly been gained manually could now be collected and structured less time depriving. The workers had a more profound data set to base their decisions on and could focus on using the DSS' outcome to fulfill the more complex tasks. Advanced training was only necessary to test the usage of the deployed system.

4 DISCUSSION

The first two cases, energy management and plant maintenance, can be considered as examples of the automation-scenario. Furthermore, the cases show indications for polarization of qualification requirements, as with the deployment of the new system the workforce divided into two different groups with dissimilar qualification requirements. However, this divide was due to a managerial decision and did not occur as the result of a gradual change of qualifications over time. The first group needed a greater analysis- and methodological competence to get a deeper understanding of all processes and working of the DSS. For these more complex activities, additional professional education was necessary. A distinct shift towards a higher qualification requirement was visible. Whereas for the second group the area of work changed completely to a more manual and communicative and less complex and analytical activities. Workers in this group received retraining. A partial shift towards lower qualification requirements could be observed. For the last two cases the results indicated that the shown human-machine-interaction can be viewed as an example of the tool-scenario. The system was deployed to process more time-consuming activities (e.g. data collection), whereas the workers could focus on more complex tasks, resulting in a work-sharing human-machine-interaction. Despite the worker's focus on more complex tasks, there was no change concerning the qualification requirements of the workers that would lead to a higher qualification level. Thus, the cases can be classified to neither upgrading nor polarization of qualification requirements. Ultimately, the clear-cut concepts might not be able to depict the full scale of qualification transformations due to the use of ICT.

5 CONCLUSION

The results show that tasks of workers affected by the use of DSS might increase in complexity or shift to another area of activity. The greatest changes concerning the qualification requirements of workers and their interaction with DSS were found in areas where pre-arranged management decisions lead to the reorganization of workers and their fields of tasks and skills. Future research may possibly increase sample size, use other forms of data-collection or focus on more diverse scenarios that can be applied to different types of ICT.

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